PB84-170646

Residential Wood Combustion Study. Task 5. Emissions Testing of Wood Stoves Volumes 3 and 4 (Appendices)

Green (Del) Associates, Inc., Woodburn, OR

Prepared for

Environmental Protection Agency, Seattle, WA

Nov 82

U.S. Department of Commerce
National Technical Information Service
NTIS

EPA 910/9-82-089h

United States
Environmental Protection
Agency

Region 10
1200 Sixth Avenue
Seattle WA 98101

PB84-170646

Air & Waste Management Division February 1984

EPA

Residential Wood Combustion Study

Task 5

Emissions Testing of Wood Stoves Volumes 3 & 4 (Appendices)

353

50272-101

REPORT DOCUMENTATION PAGE	**1. REPORT NO.** EPA 910/9-82-089h	**2.**	**3. Recipient's Accession No.** PB 84-170646

4. Title and Subtitle

RESIDENTIAL WOOD COMBUSTION STUDY TASK 5
EMISSIONS TESTING OF WOOD STOVES VOLUMES 3 & 4

5. Report Date
November 1982

6.

7. Author(s)

8. Performing Organization Rept. No.

9. Performing Organization Name and Address
Del Green Associates, Inc.
Environmental Technology Division
Woodburn, Oregon

10. Project/Task/Work Unit No.

11. Contract(C) or Grant(G) No.
(C) 68-02-3566
(G)

12. Sponsoring Organization Name and Address
U.S. Environmental Protection Agency Region 10
Air & Waste Management Division
1200 6th Avenue
Seattle, WA 98101

13. Type of Report & Period Covered
Final

14.

15. Supplementary Notes

PB84-170638

16. Abstract (Limit: 200 words)

This report contains the appendices for the results of 19 emission tests on four wood stoves and two retrofit emission control devices (reported in EPA 910/9-82-089g). The objectives of this study were to further identify the effect of wood moisture on stove emissions, to evaluate several inexpensive (simplified) test procedures for assessing particulate emissions, and to define a level of particulate emissions which can be expected from state-of-the-art improved combustion stoves. This study included evaluating previous test data reported in the literature.

A single standard operating procedure was used throughout the test program, the objective of which was to maintain a constant heat output rate, as monitored by combustion chamber temperature and stove surface temperature. A heat output rate corresponding to a relatively moderate to low burn rate (less than 2.5 kg wood/hour) was chosen. A single wood type (Douglas fir) was used throughout the study; wood size was maintained at a consistent level. Throughout the entire test program measurements were made for particulate, carbon monoxide, carbon dioxide, oxygen, and hydrocarbon content of the emissions; the gaseous constituents were monitored continuously. Measurements were made for creosote deposition, opacity, and smoke spot density.

17. Document Analysis a. Descriptors

Wood Stoves
Wood Combustion
Firewood

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement 001<	**19. Security Class (This Report)**	**21. No. of Pages**
	20. Security Class (This Page)	**22. Price**

(See ANSI-Z39.18) See Instructions on Reverse OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

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RESIDENTIAL WOOD COMBUSTION STUDY

TASK 5

EMISSION TESTING OF WOOD STOVES

VOLUMES 3 & 4

THIS REPORT CONSISTS OF SEVERAL DIFFERENT PARTS.

THEY ARE LISTED BELOW FOR YOUR CONVENIENCE.

EPA 910/9-82-089a	Residential Wood Combustion Study Task 1 - Ambient Air Quality Impact Analysis
EPA 910/9-82-089b	Task 1 - Appendices
EPA 910/9-82-089c	Task 2A - Current & Projected Air Quality Impacts
EPA 910/9-82-089d	Task 2B - Household Information Survey
EPA 910/9-82-089e	Task 3 - Wood Fuel Use Projection
EPA 910/9-82-089f	Task 4 - Technical Analysis of Wood Stoves
EPA 910/9-82-089g	Task 5 - Emissions Testing of Wood Stoves Volumes 1 & 2
EPA 910/9-82-089h	Task 5 - Emissions Testing of Wood Stoves Volumes 3 & 4 (Appendices)
EPA 910/9-82-089i	Task 6 - Control Strategy Analysis
EPA 910/9-82-089j	Task 7 - Indoor Air Quality

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RESIDENTIAL WOOD COMBUSTION STUDY

TASK 5

EMISSIONS TESTING OF WOOD STOVES

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APPENDIX A

Nomenclature and Sample Calculations

Nomenclature

An	Area of nozzle (ft^2)
As	Area of the stack (ft^2)
Bwo	Fraction by volume of water vapor in the gas stream (dimensionless)
C_f	Mass emissions factor (g/kg wood)
Cs	Concentration of particulate matter in stack gas (lb/scf, dry basis)
C's	Concentration of particulate matter in stack gas (gr/scf, dry basis)
C''s	Concentration of particulate matter in stack gas (g/scm, dry basis
Cp	Specific heat constant, Btu/mole - °F
C_t	Mass emissions (lb/hr)
E	Net efficiency, %
EA	Excess air, %
GCV	Gross calorific value, Btu/lb
H	Heat value, Btu/lb
I	Percent of isokinetic sampling, %
M_d	Molecular weight of stack gas (lb/lb mole)
M_{fh}	Particulate mass, front half (mg)
M_n	Total particulate mass (mg)
M_w	Fuel moisture (%)
MW	Molecular weight
P_{bar}	Barometric pressure (in. Hg)

Nomenclature (Cont.)

P_s	Stack pressure (in. Hg)
Q_s	Stack gas volumetric flow (DSCF/hr)
R_d	Burn rate (lb/hr, dry)
R_w	Burn rate (lb/hr, wet)
T_m	Meter temperature (°F)
T_s	Stack temperature (°F)
t_r	Run time (minutes)
t_s	Sample time (minutes)
V	Total volume of gaseous effluent during run (determined Stoichiometrically), moles
V_{lc}	Volume of condensed liquid in impingers & silica gel (ml)
V_m	Meter volume (ft^3)
$V_m std$	Volume of gas sample through the dry gas meter (std. cond.), ft^3
$V_w std$	Volume of water vapor at std. conditions, ft^3
W_{bd}	Weight of fuel burned (lbs, dry)
W_{bw}	Weight of fuel burned (lbs, wet)
W_d	Initial fuel weight (lbs, dry)
W_f	End of phase weight (lbs, wet)
W_w	Initial fuel weight (lbs, wet)
% CO	Average percent carbon monoxide measured by NDIR
% CO_2	Average percent carbon dioxide measured by NDIR
% O_2	Average percent oxygen measured by Oxygen Analyzer
% N_2	Average percent nitrogen determined by difference
ppm C_6H_{14}	Average parts per million gaseous hydrocarbon measured by NDIR, as Hexane

Sample Calculations

Example calculations are presented for Run 8.

SAMPLING PARAMETERS

1. Volume of Gas Sampled, standard conditions, ($V_{m\ std}$)

$$V_{m\ std} = (17.64\ \text{R/In. Hg})\ V_m \left(\frac{P_{bar} + \frac{\Delta H}{13.6}}{T_m + 460} \right) (Y)$$

Where

$V_{m\ std}$ = Volume of gas sampled as measured by the dry gas meter (standard conditions), dscf

V_m = Volume of gas sampled as measured by the dry gas meter, ft^3 (Form 2)*

T_m = Average dry gas meter temperature, °F (Form 2)

P_{bar} = Barometric pressure at the orifice meter, inches Hg (Form 2)

ΔH = Average pressure drop across the orifice meter, inches H_2O (Form 2)

Y = Gas meter calibration coefficient

Standard Conditions = 68°F, 29.92 in Hg (20°C, 760 mm Hg)

EXAMPLE - RUN 8

$$V_{m\ std} = (17.65)\ (46.67) \left(\frac{29.77 + 0.314/13.6}{92.61 + 460} \right) (1)$$

$$= 44.41\ \text{dscf}$$

2. Volume of water vapor in the gas sample, standard conditions ($V_{w\ std}$,dscf)

$V_{w\ std}$ = (0.0471 dscf/ml) V_{1c}

Where

V_{1c} = Total volume of liquid collected in impingers and silica gel, ml (Form 3)

EXAMPLE - RUN 8

$V_{w\ std}$ = (0.0471) 76.40 = 3.61 dscf

---

* Refers to data form from which this value is taken, as indexed in the appendix; e.g., Form 2 is "Oregon Method 7 Sampling Data".

3. Fraction by volume of water vapor in the gas stream (B_{wo}, dimensionless)

$$B_{wo} = \frac{V_{w\ std}}{V_{m\ std} + V_{w\ std}}$$

EXAMPLE - RUN 8

$$B_{wo} = \frac{3.60}{(44.41 + 3.60)} = 7.52 \times 10^{-2}$$

4. Molecular weight of stack gas, dry basis (M_d ,lb/lb mole)

$$M_d = 0.28\ (\%\ N_2 + \%\ CO) + 0.44\ (\%\ CO_2) + 0.32\ (\%\ O_2)$$

Where

% CO = Average percent value measured by the NDIR (Form 1)

% CO_2= Average percent value measured by the NDIR (Form 1)

% O_2 = Average percent value measured by Orsat for Runs 1 - 9 and by the continuous oxygen meter for Runs 10 - 19. (Form 7)

% N_2 = Average percent Nitrogen determined by difference. (Form 1)

EXAMPLE - RUN 8

$$M_d = 0.28\ (79.25 + 0.56) + 0.44\ (3.12) + 0.32\ (17.07)$$

$$M_d = 29.18 \text{ lb/lb mole}$$

5. Molecular weight of stack gas, wet basis (M_s, lb/lb mole)

$$M_s = M_d\ (1 - B_{wo}) + 18\ B_{wo}$$

EXAMPLE - RUN 8

$$M_s = 29.18\ (1 - 7.52\times10^{-2}) + 18\ (7.52\times10^{-2})$$

$$M_s = 28.34 \text{ lb/lb mole}$$

6. Percent excess air (% EA)

$$\% \text{ EA} = \frac{\% \text{ O}_2 - \% \text{ CO}/2}{0.264 \ (\% \text{ N}_2) - (\% \text{ O}_2 - \% \text{ CO}/2)} \ (100)$$

EXAMPLE - RUN 8

$$\% \text{ EA} = \frac{17.07 - 0.56/2}{0.264 \ (79.25) - (17.07 - 0.56/2)} \ (100)$$

$$\% \text{ EA} = 406.34$$

7. Stack gas volumetric flow rate (Q_s, dscf/hr), dry basis

$$Q_s = \frac{(385 \times 60) \ (V)}{t_r}$$

Where:

V = Total volume of dry gaseous effluent during run (determined Stoichiometrically), moles

t_r = Time of run, minutes

k_1 = 385 dscf/mole

k_2 = 60 minutes/hr

And V (moles) is determined Stoichiometrially, based on a carbon balance as follows:

Assume

1. Ratio of dry wood burned to moisture evaporated is constant and equivalent to wood moisture ratio at start of run.
2. All carbon is accounted for in effluent stream by CO, CO_2, C_6H_{14}, and particulate matter.
3. Carbon content of particulate matter is 70, % mass.
4. Mass content of wood (Douglas fir, dry):

Carbon	52.3%
Hydrogen	6.3%
Oxygen	40.5%
Nitrogen	0.1%
Ash	0.8%
High Heat Value	9050 Btu/lb, dry

Then

1. Carbon mass, in = Carbon mass, out
2. Calculate mass of dry wood burned, W_{bd}
3. Establish carbon balance and solve for V, moles

$$
\begin{aligned}
W_{bd} \times .523 = \; & \text{V moles} \times \%CO_2/100 \times 12 \text{ lb C/mole} \\
& + \text{V moles} \times \%CO/100 \times 12 \text{ lb C/mole} \\
& + \text{V moles} \times \text{ppm } C_6H_{14}/10^6 \times 72 \text{ lb C/mole} \\
& + \text{V moles} \times 385 \text{ ft}^3\text{/mole} \times .02832 \text{ m}^3/\text{ft}^3 \times \\
& \quad 1 \text{ \#/454 g} \times C' \text{ g/m}^3 \times 0.7 \text{ lb C/lb particulate}
\end{aligned}
$$

$$
\begin{aligned}
= \; & V/100 \, [(12 \times \%CO_2) + (12 \times \%CO) \\
& + (72 \times \text{ppm } C_6 \times 10^{-4}) + 1.68 \, C'] \\
= \; & v/100 \, [k']
\end{aligned}
$$

Therefore

$$\text{V moles total} = \frac{.523 \, W_{bd} \times 100}{K'}$$

Where:

W_{bd} = Weight of fuel burned, dry

W_{bw} = Weight of fuel burned, wet

M_w = Fuel moisture, %

V = Total volume of gaseous effluent during run, moles

C' = Measured particulate concentration, g/dscm

K' = Factor = $[(12 \times \%CO_2) + (12 \times \%CO) + (72 \times \text{ppm } C_6 \times 10^{-4}) + 1.68 \, C']$

EXAMPLE - RUN 8

$$Q_s = \frac{(385 \times 60)\,(V)}{t_r}$$

Where $V = \dfrac{.523 \, W_{bd} \times 100}{K'}$

And $k' = [(12 \times \%CO_2) + (12 \times \%CO) + (72 \times \text{ppm HC} \times 10^{-4}) + 1.68 \, C']$

Then:

$$K' = (12 \times 3.1) + (12 \times 0.6) + (72 \times 115 \times 10^{-4}) + (1.68 \times 0.89)$$

$$K' = 46.72$$

$$V = \frac{.523\ (11.7)(100)}{46.72}$$

$$V = 13.09$$

$$Q_s = \frac{(385 \times 60)(13.09)}{155}$$

$$Q_s = 1952 \text{ dscf/hour}$$

8. Percent isokinetic, (I)

$$I = \frac{100\ T_s \left[(K)\ (V_{1c}) + \left(\frac{V_m}{T_m}\right) \left(P_{bar} + \frac{\Delta H}{13.6}\right) \right]}{60\ \sigma\ V_s\ P_s\ A_n}$$

Where

K = 0.00267 in.Hg - Ft^3/ml - °R

V_{1c} = Total volume of liquid collected in impingers and silica gel, ml (Form 3)

V_m = Volume of gas sample through the dry gas meter, ft^3 (Form 2)

T_m = Absolute average dry gas meter temperature, °R (Form 2)

P_{bar} = Barometric pressure at sampling site, inches Hg. (Form 2)

ΔH = Average pressure drop across the orifice, inches H_2O (Form 2)

T_s = Absolute average stack gas temperature, °R (Form 2)

σ = Total sampling time, min. (Form 2)

V_s = Stack gas velocity, ft/sec (Calculated from Stoichiometric dscf/hr)

P_s = Absolute stack gas pressure, inches Hg (Form 2)

A_n = Cross-sectional area of nozzle, ft^2 (Form 2)

EXAMPLE - RUN 8

$$\% I = \frac{(100)\ (295 + 460) \left[(0.00267)\ 76.4 + \frac{46.67}{92.61 + 460} \left(29.77 + \frac{.314}{13.6}\right) \right]}{(60)\ (150)\ (2.39)\ (29.77)\ 0.00213}$$

$$I = 151\%$$

FUEL USE

9. Wood moisture, dry basis (M_d, percent)

Direct measurement with meter or from laboratory sample (Form 9)

EXAMPLE - RUN 8

$M_d = 126\%$

10. Wood moisture, wet basis (M_w, percent)

$$M_w = \frac{M_d}{100 + M_d} \text{ X } 100$$

EXAMPLE - RUN 8

$$M_w = \frac{126}{100 + 126} \text{ X } 100 \qquad M_w = 56\%$$

11. Fuel charge, wet basis (W_w, lb)

Direct measurement from scale (Form 1)

EXAMPLE - RUN 8

$W_w = 38.1$ lbs

12. Fuel Charge, dry basis (W_d, lb)

$W_d = W_w\ (1 - M_w/100)$

EXAMPLE - RUN 8

$W_d = 38.1\ (1 - 56/100)$

$W_d = 16.8$ lbs

13. Wood burned, dry basis (W_{bd}, lb)

$W_{bd} = W_d - W_f{}^{*}\ '1 - MW/100)$

EXAMPLE - RUN 8

$W_{bd} = 16.8 - 11.6\ (1 - 56/100)$

$W_{bd} = 11.7$ lb

14. Burn rate, wet basis (R_w, lb/hr)

$$R_w = \frac{W_w - W_f}{T_r} \times 60$$

Where

W_f = Final wood weight, lb (Form 1)

T_r = Run time, minutes (Form 1)

EXAMPLE - RUN 8

$$R_w = \frac{38.1 - 11.6}{155} \times 60$$

$$R_w = 10.26 \text{ lbs/hr}$$

15. Burn rate, dry basis (R_d, lb/hr)*

$$R_d = \frac{W_{bd}}{t_r} \times 60$$

EXAMPLE - RUN 8

$$R_d = \frac{11.7}{155} \times 60$$

$$R_d = 4.53 \text{ lbs/hr}$$

---

* NOTE: Final mass of wood is assumed to contain same percent moisture as fuel moisture at beginning of run.

EMISSIONS

16. Total particulate catch (M_n, mg)

$$M_n = M_p + M_{ff} + M_{bf} + M_{Ie} , M_{Iw} , M_{Ir}$$

Where: (Form 4)

M_p = Probe and prefilter glassware acetone wash, mg

M_{ff} = Front filter catch, mg

M_{bf} = Back filter catch, mg

M_{Ie} = Solvent extracted fraction of impinger contents

M_{Iw} = Water fraction of impinger contents

M_{Ir} = Acetone wash of post filter glassware

EXAMPLE - RUN 8

$$M_n = 120.9 + 162.3 + 57.1 + 186.8 + 232.7 + 354.6$$

$$M_n = 1114 \text{ mg}$$

17. Front half particulate catch (M_f, mg)

$$M_f = M_p + M_{ff}$$

EXAMPLE - RUN 8

$$M_f = 120.9 + 162.3$$

$$M_f = 283 \text{ mg}$$

18. Front half catch (FH, percent of total)

$$FH = \frac{M_f}{M_n} \times 100$$

EXAMPLE - RUN 8

$$FH = \frac{283}{1114}$$

$$FH = 25\%$$

19. Particulate matter concentration (C's, gr/scf)

$$C'_s = (0.0154 \text{ gr/mg}) \left(\frac{M_n}{V_{m\ std}}\right)$$

EXAMPLE - RUN 8

$$C'_s = (0.0154 \text{ gr/mg}) \left(\frac{1114.25}{44.41}\right)$$

$$C'_s = 0.386 \text{ gr/scf}$$

20. Particulate matter concentration (C_s lb/dscf)

$$C_s = (2.205\text{x}10^{-6} \text{ lb/mg}) \frac{M_n}{V_{m\ std}}$$

EXAMPLE - RUN 8

$$C_s = (2.205\text{x}10^{-6}) \text{ X } \frac{1114.25}{44.41}$$

$$C_s = 5.53\text{x}10^{-5} \text{ lb/scf}$$

21. Particulate matter concentration (C''_s, g/dscm)

$$C''_s = (0.03532 \text{ g scf/mg scm}) \left(\frac{M_n}{V_{m\ std}}\right)$$

EXAMPLE - RUN 8

$$C''_s = (0.03532) \left(\frac{1114.25}{44.41}\right)$$

$$C''_s = 0.886 \text{ g/dscm}$$

22. Particulate matter emission rate (C_t, lb/hr)

$$C_t = \frac{Q_s}{V_{m\ std}} \text{ X } M_n \text{ X } 2.205\text{x}10^{-6}$$

$$C_t = \left(\frac{1950}{44.41}\right) (1114.25) (2.205\text{x}10^{-6})$$

$$C_t = 0.107 \text{ lb/hr}$$

23. Emission factor, dry basis (C_f, g/kg wood)

$$C_f = \frac{C_t \ t_r}{W_{bd}} \qquad \frac{(\text{lb/hr})(\text{min})}{\text{lb}} \text{ X } \left[\frac{\text{hr}}{60 \text{ min}} \text{ X } \frac{454 \text{ g}}{\text{lb}} \text{ X } \frac{\text{lb}}{.454 \text{ kg}}\right]$$

EXAMPLE - RUN 8

$$C_f = \frac{(0.107)(155)}{11.7} \text{ X } 16.7 \qquad C_f = 23.6 \text{ g/kg wood}$$

TOTAL EMISSION VALUES FOR TWO PHASE SAMPLES

NOTE that for runs where two phase tests were conducted, the emission rates for the combined total test were calculated as follows:

24. Total Mass Emission Rate, lb/hr, C_t for combined phases

$$C_{t\underline{T}} = \frac{(C_t \times t_r)_1 + (C_t \times t_r)_2}{(t_r)_1 + (t_r)_2}$$

Where subscripts represent phase $\underline{1}$, phase $\underline{2}$, values and $\underline{t}$otal combined values.

25. Emission Factor, dry basis (C_f, g/kg wood)

Same as equation #23, with values for total run.

26. Stack Gas Volumetric Flow Rate ($Q_{s\underline{T}}$, dscf/hr)

$$Q_{s\underline{T}} = \frac{(Q_s \times t_r)_1 + (Q_s \times t_r)_2}{(t_r)_1 + (t_r)_2}$$

27. Particulate Matter Concentration ($C_{s\underline{T}}$ lb/dscf)

$$C_{s\underline{T}} = \frac{C_{t\underline{T}}}{Q_{s\underline{T}}}$$

28. Particulate Matter Concentration ($C''_{s\underline{T}}$, g/dscm)

$$C''_{s\underline{T}} = \frac{C_{t\underline{T}}}{Q_{s\underline{T}}} \times \text{(453.6 g/lb) (35.3 dscf/dscm)}$$

$$C''_{s\underline{T}} = \frac{C_{t\underline{T}}}{Q_{s\underline{T}}} \times 1.6\text{x}10^4$$

MISCELLANEOUS

29. Front Half Particulate as percent of total (FH, %)

$$FH_T = \frac{(M_f)_1 + (M_f)_2}{(M_n)_1 + (M_n)_2}$$

30. Net Efficiency, (E, %)

$$E = \frac{\text{Usable Heat}}{\text{Heat Input}} = \frac{\text{Heat Input (HI)} - \text{Heat Loss (HL)}}{\text{Heat Input (HI)}} \times 100$$

Where:

$HI = W_{bd} \times GCV$

$HL =$ Latent Loss + Sensible Loss

(Latent Loss) =

$$V \{[\ \%CO \times MW_{CO} \times H_{CO} \times \frac{1}{100}\ ] + [\ ppm\ HC \times MW_{HC} \times H_{HC} 10^{-6}] +$$
$$[\ C''_s \times H_p \times 385\ ft^3/mole \times 1\ lb/454\ g \times .02832\ m^3/ft^3]\} +$$
$$[\ W_{bd} \times 9\ lb\ H_2O/lb\ H \times .063\ lb\ H/lb\ Fuel + (W_{bw})(M_w/100)]\ H_H$$

(Sensible Loss)

$$+ [T_s - T_A] \{[\ V \times \%CO/100 \times C_{P_{CO}}\ ] + [\ V \times \%CO_2/100 \times C_{P_{CO_2}}\ ]$$
$$+ [V \times \%\ O_2/100 \times C_{P_{O_2}}\ ] + [V \times \%N_2/100 \times C_{P_{N_2}}\ ] +$$
$$[W_{bd} \times 9\ lb\ H_2O/lb\ H \times 0.063\ lb\ H/lb\ Fuel + (W_{bw})(MW/100)] C_{P_{H_2}})\ \}$$

Where:

GCV = 9050 Btu/lb

MW_{CO} = 28 lb/lb-mole

MW_{HC} = 86 lb/lb-mole

H_{CO} = 4350 Btu/lb

H_{HC} = 20966 Btu/lb

H_p = 10,000* Btu/lb

H_H = 1045 Btu/lb

$C_{P_{CO}}$ = 7.0 Btu/mole - °F

$C_{P_{CO_2}}$ = 9.3 Btu/mole - °F

$C_{P_{N_2}}$ = 7.0 Btu/mole - °F

$C_{P_{O_2}}$ = 7.1 Btu/mole - °F

$C_{P_{H_2})}$ = 0.46 Btu/lb - °F

* Assume 70% carbon.

EXAMPLE - RUN 8

$\text{HI} = 11.7 \times 9050 = 105{,}885$ Btu

$\text{HL} =$ Latent Loss + Sensible Loss

= (Latent Loss)

$$13.10\ \{[0.6 \times 28 \times 4350 \times 1/100] + [115 \times 86 \times 20966 \times 10^{-6}] +$$
$$[0.89 \times 10{,}000 \times 385 \times .02832 \times 1/454]\} +$$
$$[11.7 \times 9 \times .063 + (26.5)(56/100)]\ 1045$$

+ (Sensible Loss)

$$(295 - 80)\ \{[13.10 \times 0.6/100 \times 7.0] + [13.10 \times 3.1/100 \times 9.3] +$$
$$[13.10 \times 17.1/100 \times 7.1] + [13.10 \times 79.3/100 \times 7.0] +$$
$$[11.7 \times 9 \times 0.063 + (26.5)(56/100)]\ 0.46\}$$

= (Latent Loss) 37,582 +
(Sensible Loss) 22,108

= 59,690 Btu

Then:

$$E = \frac{\text{HI} - \text{HL}}{\text{HI}} \times 100$$

$$= \frac{105885 - 59690}{105885} \times 100$$

$$E = 43.6\ \%$$

31. Theoretical Creosote Deposition

1. Assume 15 foot stack with 8 inch diameter; then total stack surface area:
   $(15) \times (8/12 \times 3.14) \times (.3048\ \text{m/ft}) = 2.9\ \text{m}^2$
2. Calculate mass of total creosote deposited, C_D,
   Assuming uniform deposition on total stack surface area:
   $C_D, \text{mg} = (\text{mg/m}^2\ \text{kg})(\text{kg}) \times \text{m}^2$

3. Calculate total mass emitted, M, mg

$M = C_t$ lb/hr x $t_r/60$ x 454×10^3 mg/lb

$= C_t \times t_r \times 7.57 \times 10^3$

4. Calculate percent creosote deposition:

Creosote Deposited,% = $C_D/M \times 100$

EXAMPLE - RUN 8

C_D = 109 mg/m^2 kg x 5.3 kg x 2.9 m^2

= 1675 mg

= 1.7 g creosote

M = 0.11 lb/hr x 155 x 7.57×10^3

= 129×10^3 mg

% deposition = $C_D/M \times 100$

$$= \frac{1675}{129 \times 10^3} \times 100$$

Creosote Deposition = 1.3%

APPENDIX B

Laboratory Results

TABLE B-1

Laboratory Analyses: Oregon Method 7

RUN/ PHASE	MASS (Milligrams)								
	Acetone Rinse	Front Filter	Front Sub total	Back Filter	Impinger Solvent Extract	Impinger H_2O Fraction	Impinger Rinse	Back Sub total	TOTAL
1 / 1	27.03	16.5	43.53	13.8	6.61	2.68	26.29	49.39	92.92
1 / 2	345.08	59.6	404.68	323.3	272.18	168.50	307.06	1071.04	1475.72
2 / 1	197.02	62.9	259.92	337.1	124.79	109.73	254.89	826.53	1086.45
2 / 2	317.20	60.6	377.80	374.7	197.59	89.35	282.24	943.88	1321.68
3 / 1	367.67	77.3	444.97	237.3	184.49	105.94	123.07	650.80	1095.77
3 / 2	94.64	37.2	131.84	209.1	111.39	73.72	143.87	538.08	669.92
4	144.81	114.1	258.91	264.7	130.00	181.1	248.8	824.59	1083.5
5	594.3	230.8	825.10	413.5	842.6	1021.3	1645.6	3922.90	4748.0
6	167.2	87.6	254.80	325.2	149.9	203.77	359.3	1038.20	1293.0
7	277.95	92.3/28.3	398.55	429.2	182.09	341.11	367.4	1319.80	1718.35
8	120.86	91.5/70.8	283.16	57.1	186.8	232.59	354.6	831.09	1114.25

TABLE B-1 (Cont.)

RUN/ PHASE	MASS (Milligrams)								
	Acetone Rinse	Front Filter	Front Sub total	Back Filter	Impinger Solvent Extract	Impinger H_2O Fraction	Impinger Rinse	Back Sub total	TOTAL
9	217.4	59.9/55.4	332.70	304.0	182.2	244.21	451.0	1181.41	1514.11
10 / 1	86.65	58.1	144.75	219.2	224.19	124.87	182.2	750.46	895.21
10 / 2	191.78	78.2	269.98	144.5	486.88	239.96	466.32	1337.66	1607.64
11	285.63	68.5/74.6	428.73	316.6	314.0	351.83	766.24	1748.70	2177.40
12	420.19	78.7/93.8	592.78	128.3	578.28	634.67	1085.3	2426.55	3019.33
13 / 1	181.31	116.8	297.99	398.3	282.79	224.65	341.93	1247.81	1545.8
13 / 2	235.03	109.4	344.43	306.3	585.59	469.25	463.86	1824.99	2169.42
14 / 1	74.88	143.5	218.38	52.3	146.29	160.01	306.62	665.21	883.59
14 / 2	179.07	105.9	284.97	336.7	578.0	392.3	748.02	2055.03	2340.0
15	161.16	83.9/21.3	266.36	31.9/23.6	198.19	216.04	238.7	995.64	1262.0
16	56.31	41.1	97.41	71.0	63.0	60.81	98.45	293.26	390.67

TABLE B-1 (Cont.)

RUN/ PHASE	MASS (Milligrams)								
	Acetone Rinse	Front Filter	Front Sub total	Back Filter	Impinger Solvent Extract	Impinger H_2O Fraction	Impinger Rinse	Back Sub total	TOTAL
17 / 1	96.31	63.4	159.71	224.3	142.29	115.65	124.41/75.40	682.05	841.76
17 / 2	102.36	56.4	158.76	217.6	162.89	95.96	186.0	662.45	821.21
18	13.21	26.7	39.9	1.4	2.41	13.68	5.86	23.36	63.26
19 / 1	20.60	19.5	40.1	1.2	8.39	12.28	12.84	34.70	74.80
19 / 2	15.17	12.9	28.07	8.1	8.01	11.56	9.69	37.36	65.43

TABLE B-2

Laboratory Analyses: Creosote

Run/ Phase	Transmissometer Location			Particulate Sampling Location		
	Mass			Mass		
	Gross (g)	Tare (g)	Net (mg)	Gross (g)	Tare (g)	Net (mg)
1 / 1	49.2212	49.1819	39.3	49.2066	49.1339	72.7
1 / 2	---	---	---	49.3180	49.2309	87.1
2 / 1	49.4417	49.3763	65.4	49.1960	49.1552	40.8
2 / 2	49.5655	49.5105	55.0	49.3796	49.1854	194.2
3 / 1	49.3955	49.3840	11.5	49.4884	49.4820	6.4
3 / 2	49.5738	49.5427	31.1	49.4930	49.4871	5.9
4	49.5575	49.5422	15.3	49.2060	49.1818	24.2
5	49.2786	49.1849	93.7	49.6350	49.5105	124.5
6	49.1801	49.1549	25.2	49.2544	49.2293	25.1
7	49.5653	49.4267	138.6	68.5545	68.4827	71.8
8	66.3242	66.3046	19.6	65.4337	65.4309	2.8
9	72.2381	72.2045	33.6	69.8535	69.8385	15.0
10 / 1	70.8728	70.8709	1.9	56.9970	56.9868	10.2
10 / 2	69.6476	69.6231	24.5	70.3110	70.2572	53.8
11	66.3554	66.3202	35.2	71.2527	71.2186	34.1

TABLE B-2 (Cont.)

Run/ Phase	Transmissometer Location			Particulate Sampling Location		
	Mass			Mass		
	Gross (g)	Tare (g)	Net (mg)	Gross (g)	Tare (g)	Net (mg)
12	73.7476	73.7026	45.0	67.3516	67.2856	66.0
13 / 1	67.6911	67.6692	21.9	56.5774	56.5464	31.0
13 / 2	56.2500	56.2296	20.4	56.4268	56.3700	56.8
14 / 1	56.3435	56.3287	14.8	56.1297	56.1061	23.6
14 / 2	55.8897	55.8745	15.2	55.5130	55.4805	32.5
15	55.6777	55.6550	22.7	56.7357	56.6992	36.5
16	56.7323	56.7196	12.7	67.0621	67.0542	7.9
17	40.6840	40.6465	37.5	40.4373	40.3977	39.6
18	40.6620	40.6618	2.0	40.5220	40.5099	12.1
19 / 1	40.4457	40.4451	0.6	40.6410	40.6342	6.8
19 / 2	40.4587	40.4578	0.9	40.6566	40.6562	0.4

APPENDIX C

Quality Assurance Data

Wood Moisture

TABLE C-1

Summary of Results:
Wood Moisture Quality Assurance

		Moisture Content (Dry Basis)	
DATE	SAMPLE	LAB	METER[a]
6/30	x1	24	26
	x2	24	27
	x3	38	36
7/07	x4	30	28
	x5	19	18
	x6	20	18
7/27	x7	126	43
8/07	x8	105	-[c]
	x9	110	-[c]
	x10	117	-[c]
8/13	x11	40.1	23
	x12[b]	45.1	25
9/15	x13[b]	28.1	19

---

[a] Eight readings/piece

[b] One cross-section slice only;
all other tests - three cross-section cuts

[c] Greater than 30, not recorded

Wood Moisture Measurement Record
Quality Samples

6/30/81

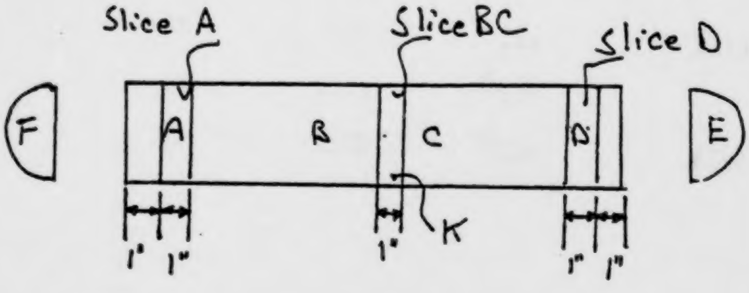
[illegible] Samples - Douglas Fir

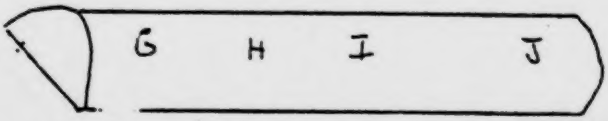
Ambent temp. ≈ 70°F

Electrode Correction +1.4
Temp. Correction

Moisture (%) (uncorrected).

Depth	Log #	Position A	B	C	D	E	F	G	H	I	J	K
½"	X-1	13	23.5	24.0	19½	16½	10	19	~~15½~~ 40	~~40~~ 3[illegible]	[illegible]	[illegible]
1"		13.5	24.0	25	21	19	11½	18	~~15½~~ 40	40	22	
½"	X2	20	24	24	20½	16	14½	17½	31	32	3[illegible]	
1"		19½	24	24	21	19	16	17½	27	24	[illegible]	
½"	X3	26	27	27	21½	~~23~~ 11	25	37	46	42		
1"		27	27	27	19½	15½	26	27	27	27		[illegible]


Slice A
Slice BC
Slice D
F
A
B
C
D
E
K
1"
1"
1"
1"
1"



7/1/71
J.C.

QA moisture samples

Douglas Fir - Lot #1
Ambient Temp = 72°F
Delmhorst Moisture Detector,
Model # RC-1C

Electrode Correction [illegible]
Temperature Correction 0

Moisture (%) uncorrected

Log#	Depth	Position A	B	C	D	E	F	G	H	I	J	K
X 4	1/2"	17.5	23	23	23	16.5	16.5	28	30	37	22	21
	1"	22	23	23	22	20	19.5	24	24	22	22	23
X 5	1/2"	13.5	20	19.0	13.5	10.5	17.5	15.5	18.5	17.0	13.5	20
	1"	19.0	20	19.0	13.5	12.0	15.0	16.0	18.5	18.0	13.0	19.5
X 6	1/2"	16.0	20	21	15.0	12.0	14.0	14.5	18.5	18.0	14.5	19.0
	1"	16.5	20	21	15.0	13.0	15.5	15.5	20	19.0	15.0	19.0

X4 - ~~30lbs~~ 20 lbs, 1/2 log, with bark, split 1 week earlier

X5 - 25 lbs, 1/2 log, with bark, fresh split

~~X~~
X6 - ~~24~~ 2.4 lbs, 1/2 log, with bark, fresh split

Moisture Content

7/27/81

Log #	A	B	C	D	E	F	G	H	Ave.
X7-A	27	32	22	28	56	52	54	54	41 uncorrected
BC									
[illegible]									

Lab Results

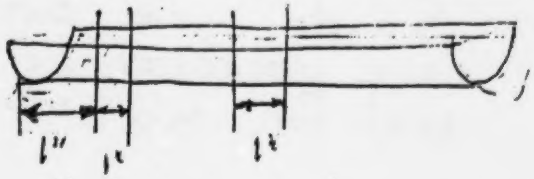
		?		
X7	A	134	~~1~~58.1	ave = 55
	BC	101.4	50.3	
	D	136.9	57.8	

Moisture Samples 8/7/81

Wood Lot # 2 - High Moisture, Douglas Fir

This lot consisted of freshly cut Douglas Fir 2" to 6" in diameter. It was cut, split, and placed in plastic garbage sacks the same day.
Representative samples were cut and sent for an oven drying method moisture content test.

Samples were cut as follows:



Sample E - end
C - center

Log #	Circumference
X 8	10"
X 9	14"
X 10	9" - unsplit

Q.A. Moisture Sample

8/31/81
J.C.

Douglas Fir Lot #3

Log #	A	B	C	D	E	F	G	H
X 11	14	20	22	15	27	22	24	27

15
29

Samples were cut using the same procedures as before and send for lab oven drying analysis.

Log #
X 11 - Length - 18"
Circumference - 16"
Weight - 2.6 lbs

QA Moisture Samples

Log X 12	A	B	C	D	E	F	G	H	Ave
	~~23~~	~~24~~	22	21	23	24	27	26	
	18	21							

22.[illegible]
21.[illegible]

Douglas Fir Lot #3

X 12 - length 17", circumfrance 12", weight 3lbs

QA Moisture Sample 9/15

Log #134 (see pg 9)

17.5
1.8

A single slice was cut from the center of the log

Log#	A	B	C	D	E	F	G	H	Ave	
130	16	23	24	17	18	23	25	23	21.1	16
131	19	22	23	23	23	24	26	19	22.4	14
132	15	22	23	17	16	20	21	14	18.6	13
133	21	24	25	23	22	23	23	23	23.0	16
134	16	20	21	14	15	20	20	14	~~17.5~~	12
135	25	27	27	26	36	26	28	27		15
136	20	20	23	23	23	23	23	24		13
137	14	22	23	15	18	24	24	19		14
138	16	24	23	19	21	26	26	23		14
139										

Logs# 130-133 used in Run #18, corrected ave = 21.3% M.

Logs# 135-138 used in Run #19

Laboratory Results: Wood Moisture

aqua tech laboratory, inc.

2417 S.E. HAWTHORNE PORTLAND, OREGON 97214
(503) 233-9871

July 10, 1981

OMNI Environmental Services
10260 S. W. Nimbus, M-8
Portland, Oregon 97223

Laboratory Report No. 810713

Subject: Moisture content of firewood, PS048
Sample received: June 30 and July 7, 1981

Sample	Moisture content, %	Sample	Moisture content, %
6-30-81		7-7-81	
X 1-A, 1/6 bark	16,1	X 4-A, full bark	30.2
X 1-BC, full bark	23.6	X 4-BC, 5/6 bark	33.2
X 1-D, 5/6 bark	31.7	X 4-D, 7/8 bark	26.0
X 2-A, no bark	18.1	X 5-A, 7/8 bark	17.6
X 2-BC, 3/4 bark	35.1	X 5-BC, 5/6 bark	21.4
X 2-D, 1/2 bark	19.6	X 5-D, 3/4 bark	16.9
X 3-A, 3/4 bark	37.5	X 6-A, 1/2 bark	19.4
X 3-BC, 2/3 bark	41.7	X 6-BC, 4/5 bark	22.5
X 3-D, 3/4 bark	33.3	X 6-D, 7/8 bark	16.8

Test procedures followed ASTM D-2016

Moisture content, % = $[(A - B)/B] \times 100$

Respectfully submitted,
AQUA-TECH LABORATORY, INC.

C. L. Chang

C. L. Chang, President

[illegible] UPS[illegible]LATED ANALYSIS

Wood Moisture

Sample # 134

Gross & Tare, g	87.4
Tare, g	1.8
Net wet wt. g	85.6
1st wt	68.7
2nd wt	68.6
net dry wt. g	66.8

Moisture 28.1 %

X1-6

OMN: Del Green

Wood Moisture P3048

81-7-27 Samples

Sample	X 7-A full bark	X 7-B,C full bark	X 7-D full bark
Gross [tare + wood]	188.6	206.2	205.8
tare	2.8	3.2	2.3
net initial wt. g.	185.8	203.0	203.5
1st wt	82.1	107.6	100.0
2nd wt	80.9	106.0	91.4
3rd wt.	80.9	105.0	89.1
4th	80.6	104.2	88.4
5th	80.5	104.0	88.2
tare	2.8	- 3.2	- 2.3
net dry	77.7	100.8	85.9
Moisture	108.1 g	102.2	117.6
% Moisture	139.1 %	101.4 %	136.9%

$$\% \text{ Moisture} = \frac{A - B}{B} \times 100$$

A — initial wet weight

B -- dry weight

Note: large amount of wood resin. Volatile substances keep coming out. No more drying attempted.

OMNI Del Green
Wood Moisture P3048
rec'd August 5, 1981

Sample	X8-E, 5/6	X8-C, full	X9-C, 2/3	X9-E, 3/4
gross [tare + wood]	93.6	91.3	216.4	205.8
tare	2.8	1.8	3.5	3.4
net initial wt. g	90.8	89.5	212.9	202.4
1st wt.	47.1	44.8	132.7	124.3
2nd wt.	47.6	45.3	110.0	106.3
3rd wt.	47.3	45.3	110.4	104.7
4th wt.			104.3	99.5
5th wt.			104.5	100.1
tare	- 2.8	- 1.8	- 3.5	- 3.4
net dry	44.5 g	43.5 g	101.0 g	96.7 g
Moisture	46.3 g	46.0 g	111.9 g	105.7 g
% Moisture	104.0 %	105.8 %	110.8 %	109.3 %

Sample	X10-C, round branch	X10-E, round branch
gross [tare + wood]	82.3	64.6
tare	1.2	2.2
net initial wt. g	81.1	62.4
1st wt.	38.9	31.5
2nd wt.	39.1	31.6
3rd wt.	39.2	31.6
tare	- 1.2	- 2.2
net dry	38.0 g	28.4 g
Moisture	43.1 g	34.0 g
% Moisture	113.4 %	119.7 %

OMNI. Wood Moisture. PS048

Sample rec'd 8-31-81

Sample	X-11, A	X-11 BC	X-11 D
Gross + Tare g	145.25	148.9	114.9
Tare	2.2	2.2	2.3
Net wet wt. g	143.05	146.7	112.6
1st. wt. g	104.0	106.3	81.9
2nd wt. g	104.2	106.4	82.0
3rd wt.	104.6	106.7	82.5
Net Dry wt. g	102.4	104.5	80.2
Moisture g	40.6	42.2	32.4
% Moisture	37.6%	40.4%	40.4%

OMNI

Wood Moisture Content

Sample rec'd 9-9-81

Sample	X-12
wet wt & Tare	78.5 g
Tare	2.6 g
net wet wt	75.9 g
1st wt	54.9
2nd wt	54.8
net dry wt	52.3

Moisture content $\frac{75.9 - 52.3}{52.3} = 45.1\ \%$

Particulate Sampling Equipment

Gas Meter Calibration

Enlivironmental Services, Inc.
10260 SW Nimbus Ave., M-8
Portland, Ore. 97223
(503) 620-7337

OMNI

Orifice Napp Gas Meter Napp Date 7/20/81 Barometric Pressure Pb: 30.14"Hg

Orifice Manometer ΔH In.H_2O	GAS VOLUME		TEMPERATURE				TIME	RESULTS	
	Wet Test Meter V_w,cf	Dry Gas Meter V_d,cf	Wet Test Meter t_w,°F	Dry Gas Meter Inlet t_{di},°F	Dry Gas Meter Outlet t_{do},°F	Dry Gas Meter Average t_d,°F	θ,min.	Y	ΔH@
0.25	0.996	1.014	72	80	78	79	3:39.5	0.99	1.87
0.75	0.996	1.002	71	78	77	78	2:05.4	1.01	1.82
1.50	1.996	2.025	73	81	78	80	2:57.5	0.99	1.83
2.50	1.995	2.029	72	82	78	80	2:16.0	0.99	1.79
4.00	1.994	1.998	72	80	77	79	1:49.5	1.00	1.87
							Average	1.00	1.84

$$Y = \frac{V_w P_b (t_d + 460)}{V_d \left(P_b + \frac{\Delta H}{13.6}\right)(t_w + 460)}$$

$$\Delta H@ = \frac{0.0317 \; \Delta H}{P_b (t_{do} + 460)} \left[\frac{(t_w + 460)\theta}{V_w}\right]^2$$

Probe Nozzle Date

D_n, In.	D_n, In.	D_n, In.

Averages

Pitot Tube Date

Forward			Reverse		
ΔP_s	ΔP_{std}	C_p	ΔP_s	ΔP_{std}	C_p

Average

$$C = 0.99 \left[\Delta P_{std}\right]^{\frac{1}{2}}$$

Environmental Services, Inc.
10260 SW Nimbus Ave., M-8
Portland, Ore. 97223
(503) 620-7337

OMNI

CALIBRATION OF "S" TYPE PITOT TUBE

Probe-Type "S" Pitot Tube: ID. No. NAPP - 6' Tubing (ID) ______

Standard Pitot-Static Tube: ID. No. ______ Pitot Orifice Size (D) ______

NBS Standard Pitot-Static Tube $C_p = \left[\frac{1}{k}\right]^{1/2}$ 0.99

Barometric Pressure ______ Duct Gas Temperature ______ Relative Humidity ______

Date 7/2/81 Calibration Operator(s) GEN, JS (DEG)

Legs A, B of "S" Type Pitot Tube	Standard Pitot-Static Tube ΔP in. H_2O	"S" Type Pitot Tube ΔP in. H_2O	Gas Velocity ft./sec.	C_p Test Leg A	C_p Test Leg B
A	0.06	0.11		0.731	
B	0.07	0.11			0.790
A	0.11	0.20		0.734	
B	0.12	0.19			0.787
A	0.24	0.36		0.808	
B	0.31	0.46			0.813
	$C_p \text{ Test} = \left[\frac{\Delta P_{std}}{\Delta P_{Test}}\right]^{1/2} C_{p_{std}}$				
A	0.52	0.71		0.847	
B	0.65	0.90			0.841
A	0.79	1.10		0.839	
B	0.89	1.20			0.852
A	1.20	1.60		0.857	
B	1.20	1.70			0.832
A					
B					

$_A$ = 0.803

$_B$ = 0.819

OMNI

Environmental Services
1360 NW Lancaster [illegible] Ct
Beaverton OR [illegible]
[illegible]

3'

CALIBRATION OF "S" TYPE PITOT TUBE

Probe-Type "S" Pitot Tube: ID. No. ______ Tubing (ID) ____________

Standard Pitot-Static Tube: ID. No. ______ Pitot Orifice Size (D) ______

NBS Standard Pitot-Static Tube $C_p = \left[\frac{1}{k}\right]^{1/2}$ 0.99

Barometric Pressure ______ Duct Gas Temperature ______ Relative Humidity ______

Date 7/2/81 Calibration Operator(s) GEN, J.S (DEQ)

Legs A, B of "S" Type Pitot Tube	Standard Pitot-Static Tube ΔP in. H_2O	"S" Type Pitot Tube ΔP in. H_2O	Gas Velocity ft./sec.	C_p Test Leg A	C_p Test Leg B
A	.05	.07		.836	
B	.05	.08			.783
A	.11	.18		.774	
B	.11	.17			.796
A	.28	.41		.818	
B	.35	.51			.820

$C_{p_A} = 0.824$

$C_{p_b} = 0.816$

$$C_p \text{ Test} = \left[\frac{\Delta P_{std}}{\Delta P_{Test}}\right]^{1/2} C_{p_{std}}$$

A	.73	1.0	.846	
B	.67	.93		.840
A	1.2	1.7	.832	
B	.86	1.2		.838
A	.49	.68	.840	
B	1.1	1.6		.827

Gaseous Measurements

TABLE C-2

Gaseous Calibrations Data

			METER		ORSAT	
Date	Cal Gas		Pretest	Post Test	Pretest	Post Test
7/21/81	CO	0.50	0.5	0.5	--	
		7.25	7.25	--	7.4	
	CO_2	3.57	4.0	4.0	3.4	
		7.47	7.5	7.5	7.5	
	O_2	Air	--		20.0	
7/22/81	CO	0.50	--		0.6	
		7.25	--		5.0	
	CO_2	3.57	3.6			
		7.47	7.5		7.0	6.6
		13.0	13.0		--	
	O_2	Air	--		20.6	
7/23/81	CO	0.50	0.5		0.6	
		7.25	7.35			
	CO_2	3.57	3.6			
		7.47	7.5		7.0	
		13.0	13.2			
	O_2	Air	--		20.6	
8/05/81	CO	0.50	0.50	0.5	0.5	
		7.25	7.25	7.25	--	
	CO_2	3.57	3.6	4.0	--	
		7.47	7.5	8.0	7.0	
		13.0	13.0	--	--	
	O_2	3.7	3.9	3.9	3.8	
		Air	20.9	20.8	20.2	
	HC	710.	705.	690.	--	
8/06/81	CO	0.50	0.5	0.5		
		7.25	7.1	7.15		
	CO_2	3.57	3.6	--		
		7.47	7.5	7.5		
		13.0	--	12.0		
	O_2	3.7	4.0	4.1		
		Air	20.9	20.5		
	HC	710.	700.	700.		

TABLE C-2 (Cont.)

			METER		ORSAT	
Date	Cal Gas		Pretest	Post Test	Pretest	Post Test
8/07/81	CO	0.50	0.5	0.5		
		7.25	7.3	7.1		
	CO_2	3.57	3.6	3.3		
		7.47	7.5	7.5		
	O_2	3.7	3.95	4.0		
		Air	20.9	20.4		
	HC	710.	700.	700.		
8/25/81	CO	0.50	0.5	0.5		0.3
		7.25	7.2	7.2		--
	CO_2	3.57	3.6	3.6		--
		7.47	7.4	7.5		3.2
	O_2	3.7	--			--
		Air	20.2	20.5		20.6
	HC	710.	710.	720.		--
8/26/81	CO	0.50	0.5	0.5	0.5	0.2
		7.25	7.2	7.5	--	--
	CO_2	3.57	3.6	3.6	--	--
		7.47	7.5	7.6	7.4	7.0
	O_2	3.7	4.5	--	--	--
		Air	21.0	20.5	21.0	21.0
	HC	710.	710.	650.	--	
8/27/81	CO	0.50	0.5	0.55	0.5	
		7.25	7.3	8.0	--	
	CO_2	3.57	3.6	3.6	--	
		7.47	7.5	13.0[a]	7.0	
	O_2	3.7	--	--	--	
		Air	21.0	--	21.0	
	HC	710.	700.	650.	--	

---

[a] Suspect 13% cal gas used although record indicates 7.47

TABLE C-2 (Cont.)

			METER		ORSAT	
Date	Cal Gas		Pretest	Post Test	Pretest	Post Test
9/01/81	CO	0.50	0.5	0.5	0.6	
		7.25	7.3	7.0	--	
	CO_2	3.57	3.6	3.6	--	
		7.47	7.5	10.0	7.2	
	O_2	3.7			--	
		Air	21.0		20.0	
	HC	710.	700.	700.	--	
9/03/81	CO	0.5	0.5	0.5	--	0.6
		7.25	7.2	7.2	3.6	7.2[a]
	CO_2	3.57	3.6	3.6	--	--
		7.47	7.0	7.5	--	7.0
		13.0			13.0	
	O_2	3.7				--
		Air	21.0		21.0	21.0
	HC	710.	700.	650.	--	--
9/04/81	CO	0.5	0.5	0.5		
		7.25	7.2	7.3		6.4
	CO_2	3.57	--	--		
		7.47	7.5	7.5		7.0
		13.0	13.0	13.0		
	O_2	3.7	--			
		Air	21.0			20.6
	HC	710.	700.	700.		
9/09/81	CO	0.5	0.5	0.5		
		7.25	7.2	7.0		
	CO_2	3.57	--	--		
		7.47	7.5	7.5		
		13.0	13.0	--		
	O_2	3.7	--	--		
		Air	21.0			
	HC	710.	710.	700.		

---

[a] Switched Orsat before test

TABLE C-2 (Cont.)

			METER		ORSAT	
Date	Cal Gas		Pretest	Post Test	Pretest	Post Test
9/15/81	CO	0.5	0.5	0.5		0.0
		7.25	7.4	--		
	CO_2	3.57	--	--		
		7.47	7.5	--		
		13.0	13.0	13.0		12.8
	O_2	3.7				
		Air	21.0	21.0		20.5
	HC	710.	710.	660.		

A-11

EPA UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Research Triangle Park, North Carolina 27711

Certificate of Analysis

July 6, 1981

Aug 6
Sept 6

Mr. Paul Tiegs
Omni Environmental
Bldg. M-8, 10260 NW Nimbus Ave.
Portland, OR 97223

CYLINDER NO.	Conc., % O_2
FF6118	3.70

This analysis is traceable to NBS SRM 1609.

CYLINDER NO.	Conc., % CO_2
FF5652	3.57

This analysis is referenced to NBS SRMs 1673, 1674, and 1675.

CYLINDER NO.	Conc., ppm CO
SD010347	2599

This analysis is referenced NBS SRMs 1679, 1680, and 1681.

This certification shall be in effect for a period of two years. Recertification at more frequent intervals may be necessary to comply with certain recertification protocols.

This sample material is on loan from the U.S. Environmental Protection Agency for a period not to exceed 90 days. Please return, shipping costs prepaid, to: [illegible]
U.S. Environmental Protection Agency
EMSL/QAD Standards Laboratory
Research Triangle Park, NC 27711

ENVIRONMENTAL MONITORING SYSTEMS LABORATORY
QUALITY ASSURANCE DIVISION

STANDARDS LABORATORY

Dorothy Droog

EPA(RTP)420 REVISED 1/80

Transmissometer

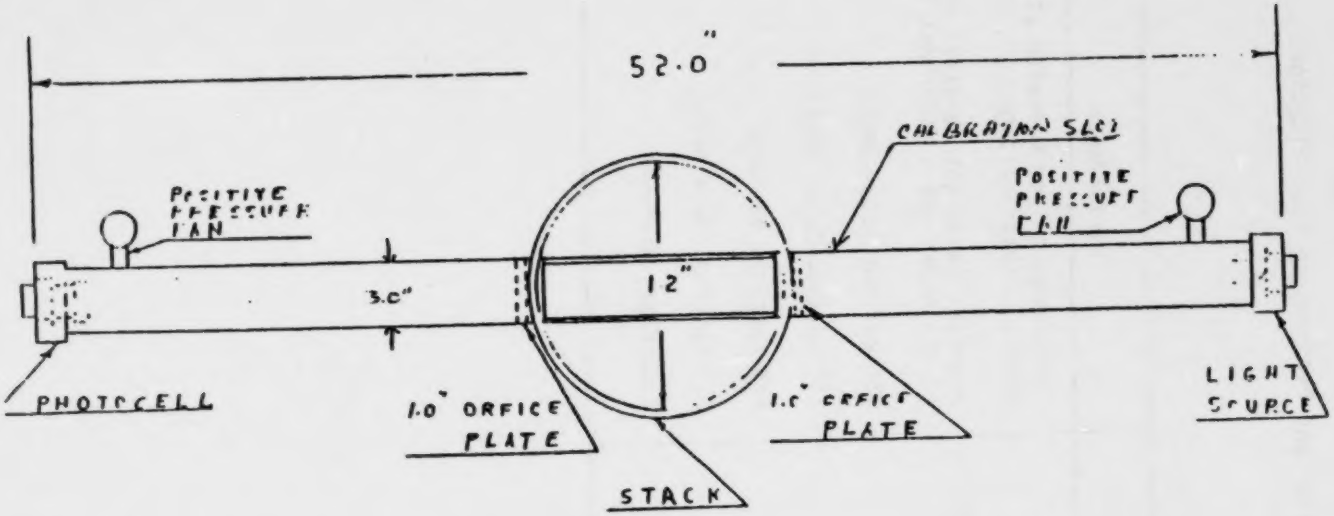
TABLE C-3

Smoke Meter Design and Performance Specifications

Parameter	Performance
Light Source	Incandescent lamp operated at ±5% of nominal rated voltage.
Spectral response of photocell	Photopic (daylight spectral response of the human eye - reference 4.3)..
Angle of View	15° maximum total angle.
Angle of Projection	15° maximum total angle.
Calibration Error	±3% opacity, maximum.
Zero and Span Drift	±1% opacity, 30 minutes.
Response Time	5 seconds, maximum

FIGURE C-1

Transmissometer Schematic


52.0"
CALIBRATION SLOT
POSITIVE PRESSURE FAN
POSITIVE PRESSURE FAN
3.0"
12"
PHOTOCELL
1.0" ORFICE PLATE
1.0" ORFICE PLATE
STACK
LIGHT SOURCE

ENVIRONMENTAL
INDUSTRIES
CARY – N. C.
SEPT – 1974.

Photocell:

- Valtec Selenium #R75EB
- Kodak Wratten 103 Filter

Light Source:

- GE 1073 12.8 Volt, 1.80 Amp

Power Source:

- 12 Volt Battery (Auto)

Transmissometer Calibration (Daily)

Emission Test Run [illegible] Date [illegible]

PRETEST CALIBRATION

Date 7-21-81 Operator [illegible]

Time 0545

Calibration Error: Zero 0 Span 0

[illegible]

Filter Value	Meter Value		
17.5	16.5	17	16.5
[illegible]	48	48	48
[illegible]	77	[illegible]	78

Response Time: Upscale (seconds) 3 Downscale (seconds) 3

POST TEST CALIBRATION

Date 7 Operator [illegible]

Time 1553

Calibration Drift: Zero -1 [illegible] Span

Calibration Error: Filter Value Meter Value

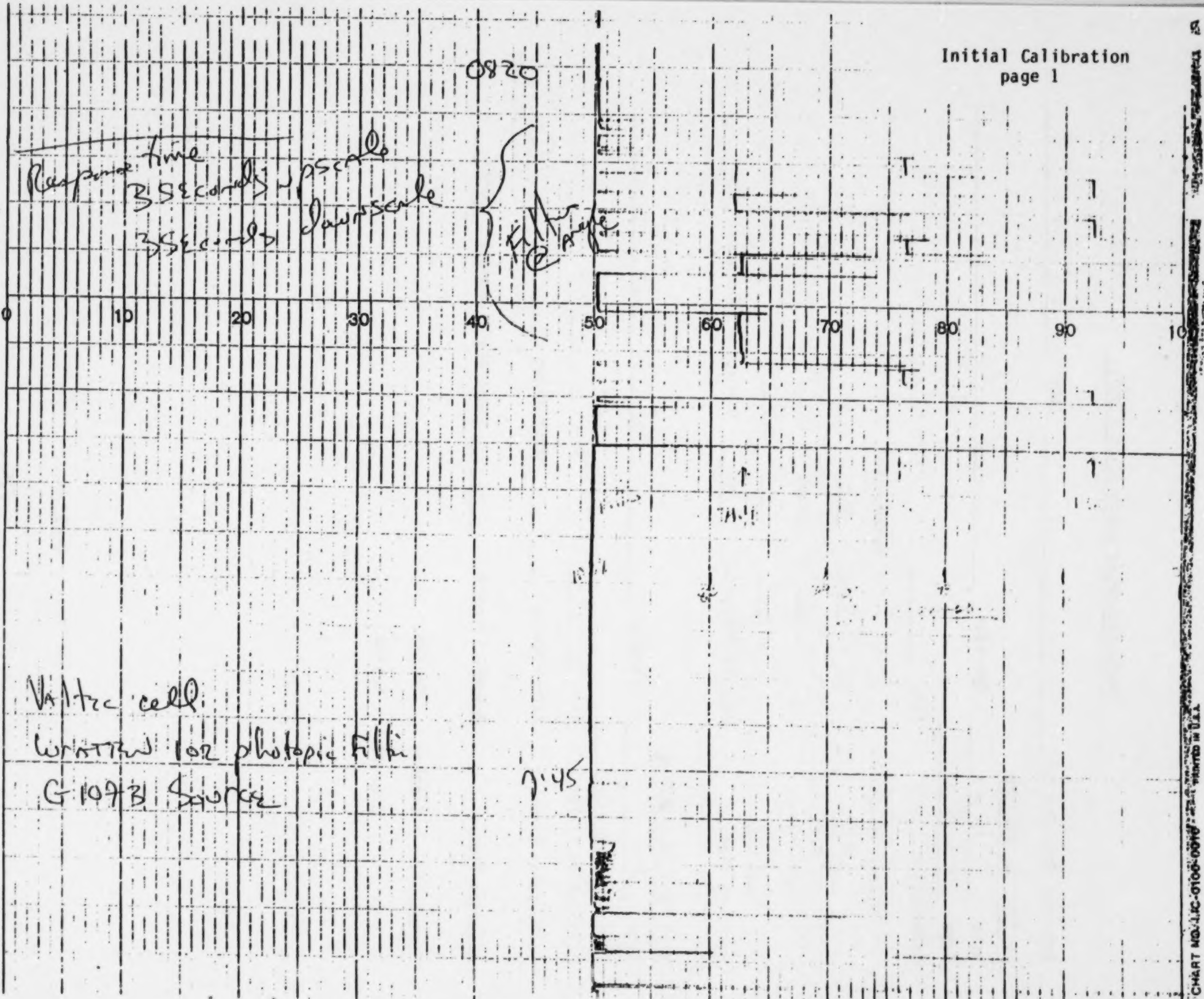
[illegible] Check [illegible] stack [illegible]

Response Time: Upscale (seconds) 5sec Downscale (seconds) 5sec

Photocell: Checked Yes/No

Cleaned Yes/No

Initial Calibration
page 1



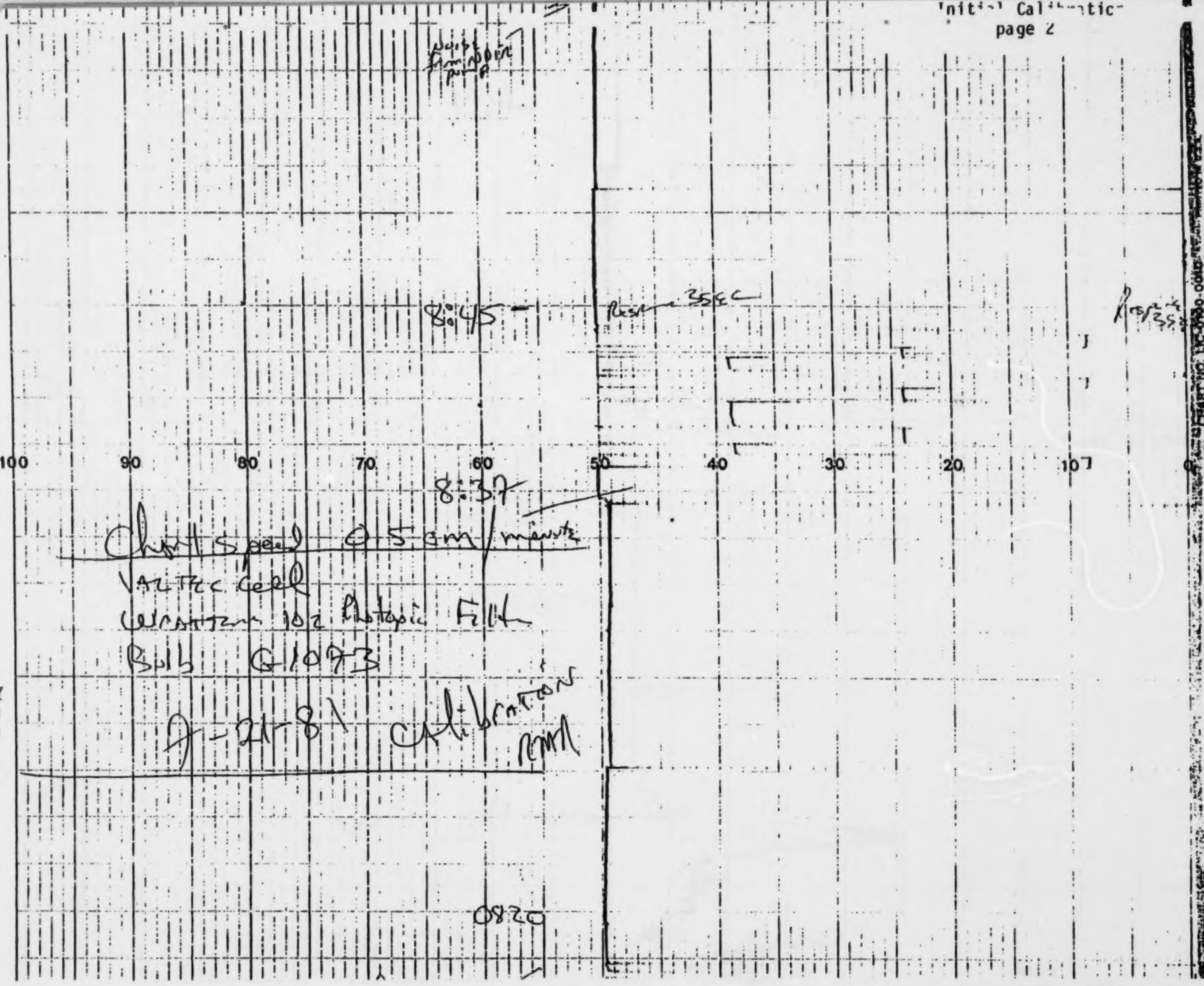
0820

Response time
3 seconds upscale
3 seconds downscale

Filter @ angle

Valtec cell
written for photopic filter
G 1073 source

7:45



Noise from pump

8:45

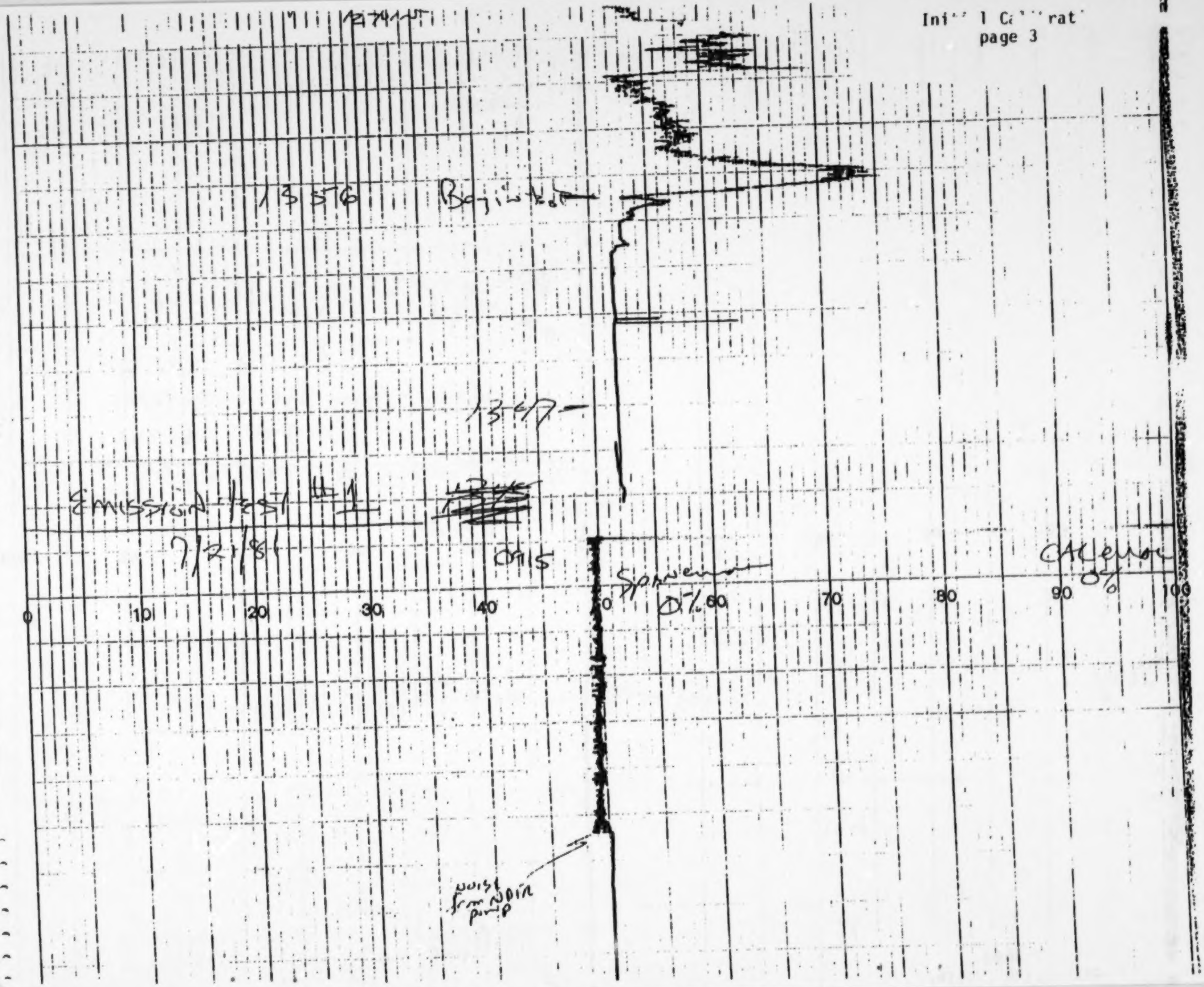
Response 3 sec

Resp 3 sec

8:37

Chart speed 0.5 cm/minute
VARITEC Cell
Wratten 102 Photopic Filter
Bulb G1093
7-21-81 Calibration

0820


12741-15
13 576
Begin test
1347
Emission test #1
7/21/81
0915
Span
0%
CAL
0%
noise from NDIR pump
0
10
20
30
40
0
60
70
80
90
100

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ENVIRONMENTAL MONITORING SYSTEMS LABORATORY
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27711

Certificate of Analysis

PERCENT OPACITY CERTIFICATION

Filter #	True Value (% Opacity)
03 FNG 005-B	32.2
03 FNG 003-29	14.2
03 FNG 007-29	45.7
03 FNG 009-29	70.7

METHOD OF FILTER CALIBRATION

The filters were supplied from the vendor with a chart record of optical density vs wavelength (350 to 700 nm) using a Cary Model 14 spectrophotometer. These data were verified by using an independent laboratory to check this scan and their results confirmed the uniform response of the filters over the visible region. The actual calibration was made using a transmissometer with a well collimated light source and a photopic response. The linearity of this transmissometer was checked with optical filters certified by NBS. The values for each test filter were measured, rotated 90 degrees and measured again. The average value was calculated in percent opacity and reported as the true value.

SOURCE BRANCH

5/15/81

M. Rodney Midgett, Chief

TABLE C-4

Results:
EPA Audit Filters

10/6/81

Trans. calibration w. The EPA Reference Filters.

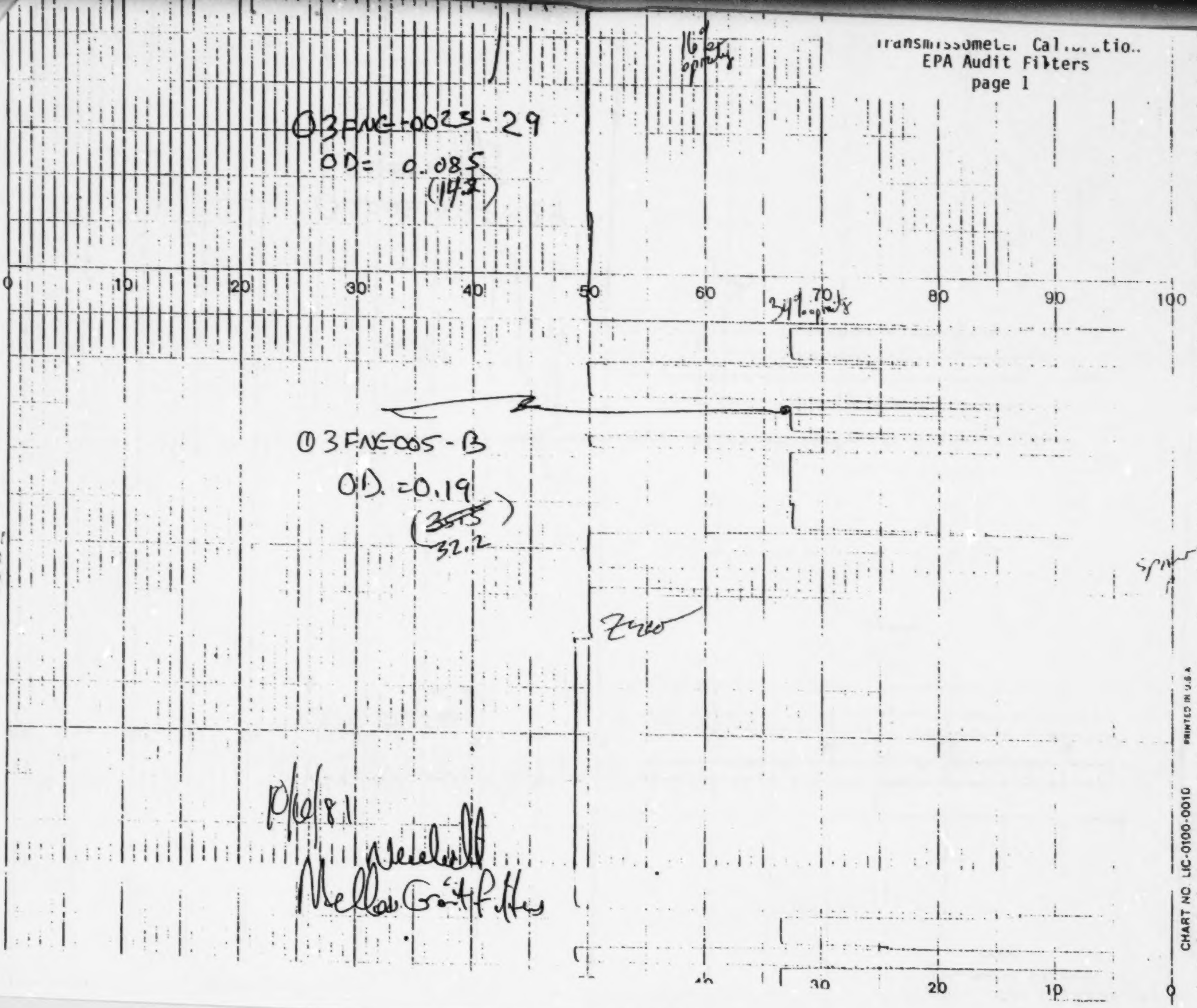
(see strip chart)

Results

	Reference Value			
OD	opacity			Measured Value
	nominal	certified		
0.525	70.2	70.7		73.5
0.26	45.0	45.7		48
0.19	35.5	32.2		~~16~~ 34
0.085	17.8	14.2		16
	100	~~100~~		100

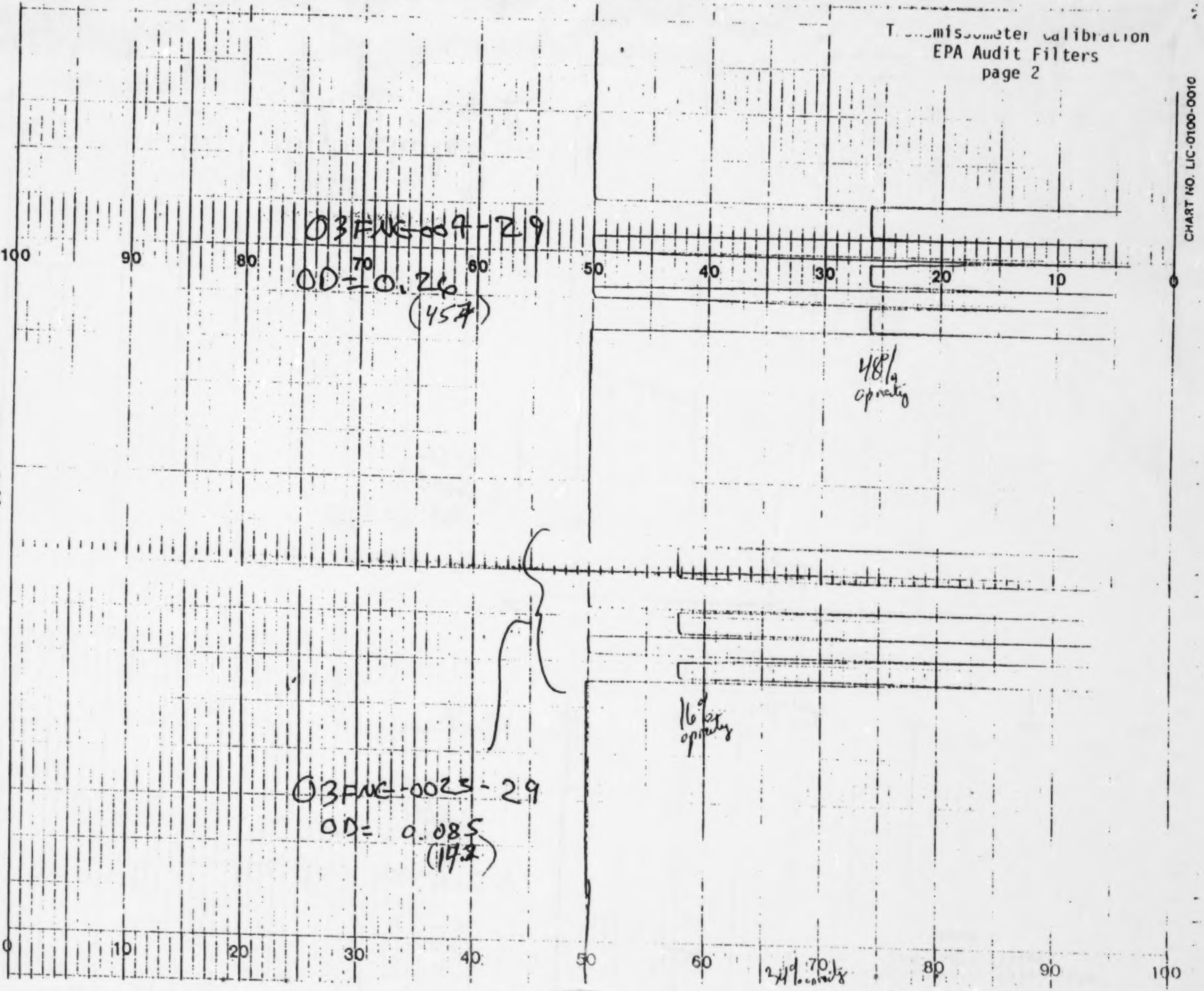
Roy Neulicht 10/6/81

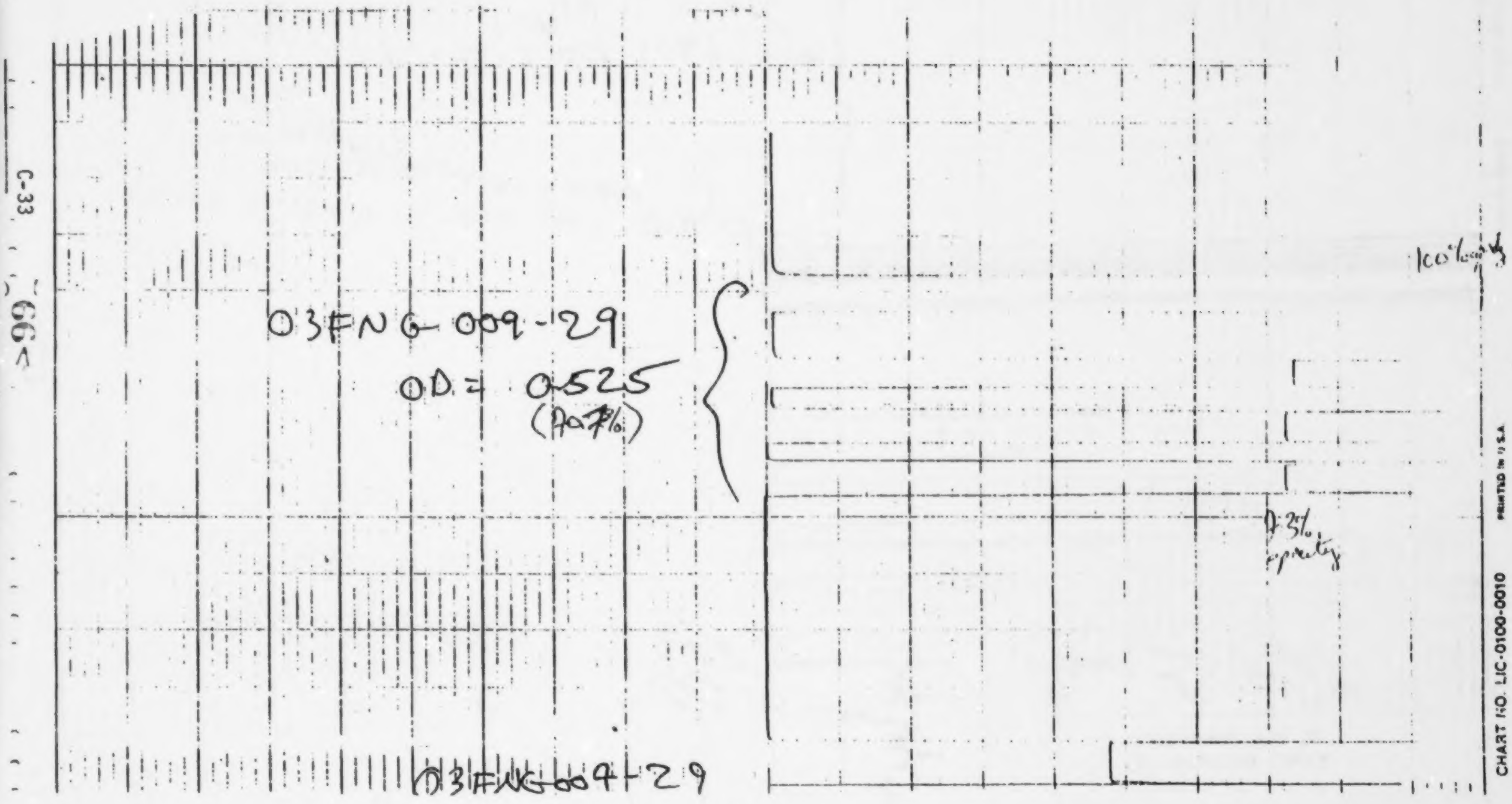
Transmissometer Calibration
EPA Audit Filters
page 1

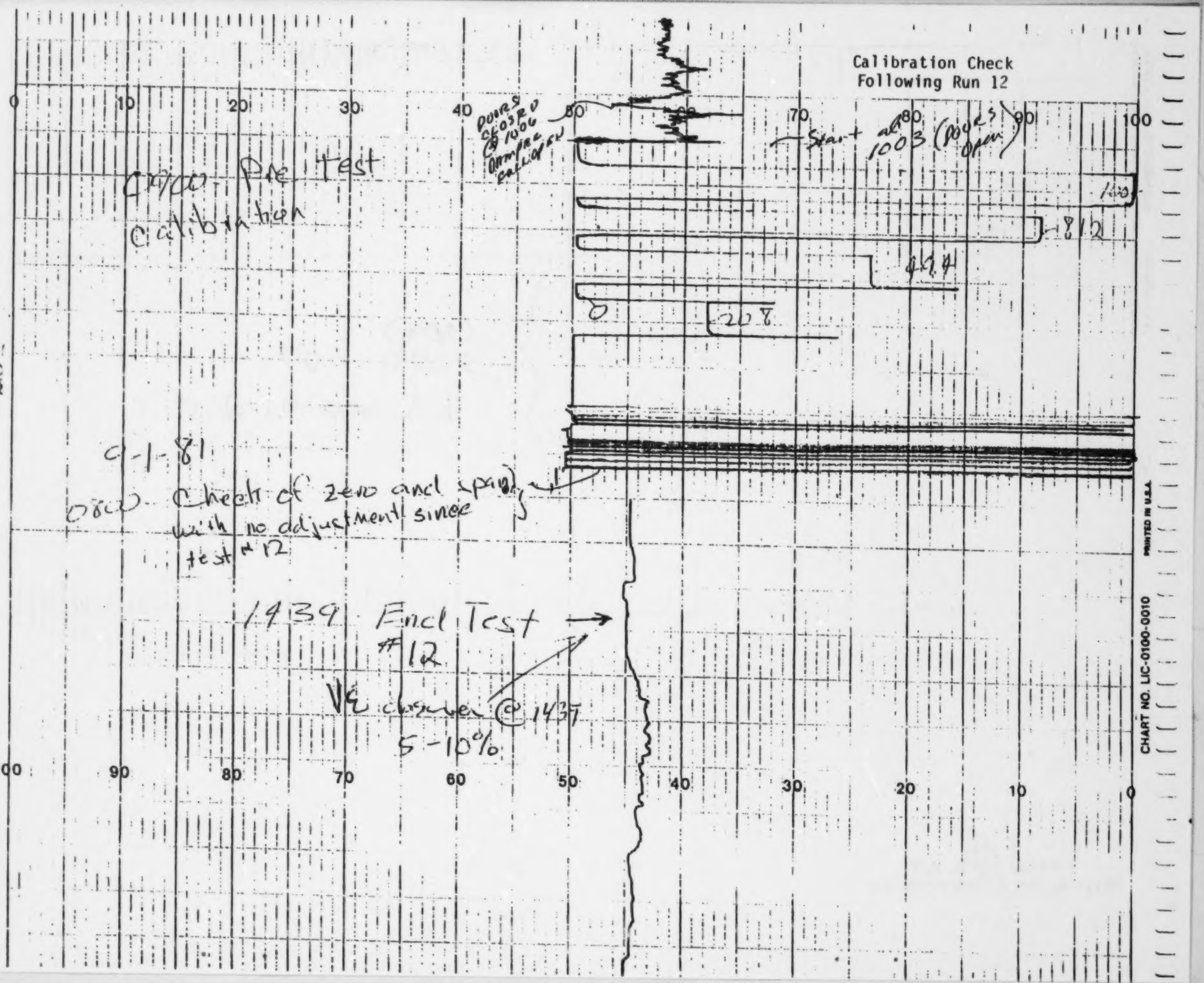


10/10/81

Transmissometer calibration
EPA Audit Filters
page 2




03FNG-009-129
OD = 0.525
(70.7%)
100% light
0.3% opacity
03FNG-004-29
CHART NO. LIC-0100-0010
PRINTED IN U.S.A.



Calibration Check
Following Run 12

Doors closed @ 1006 Damper fall open

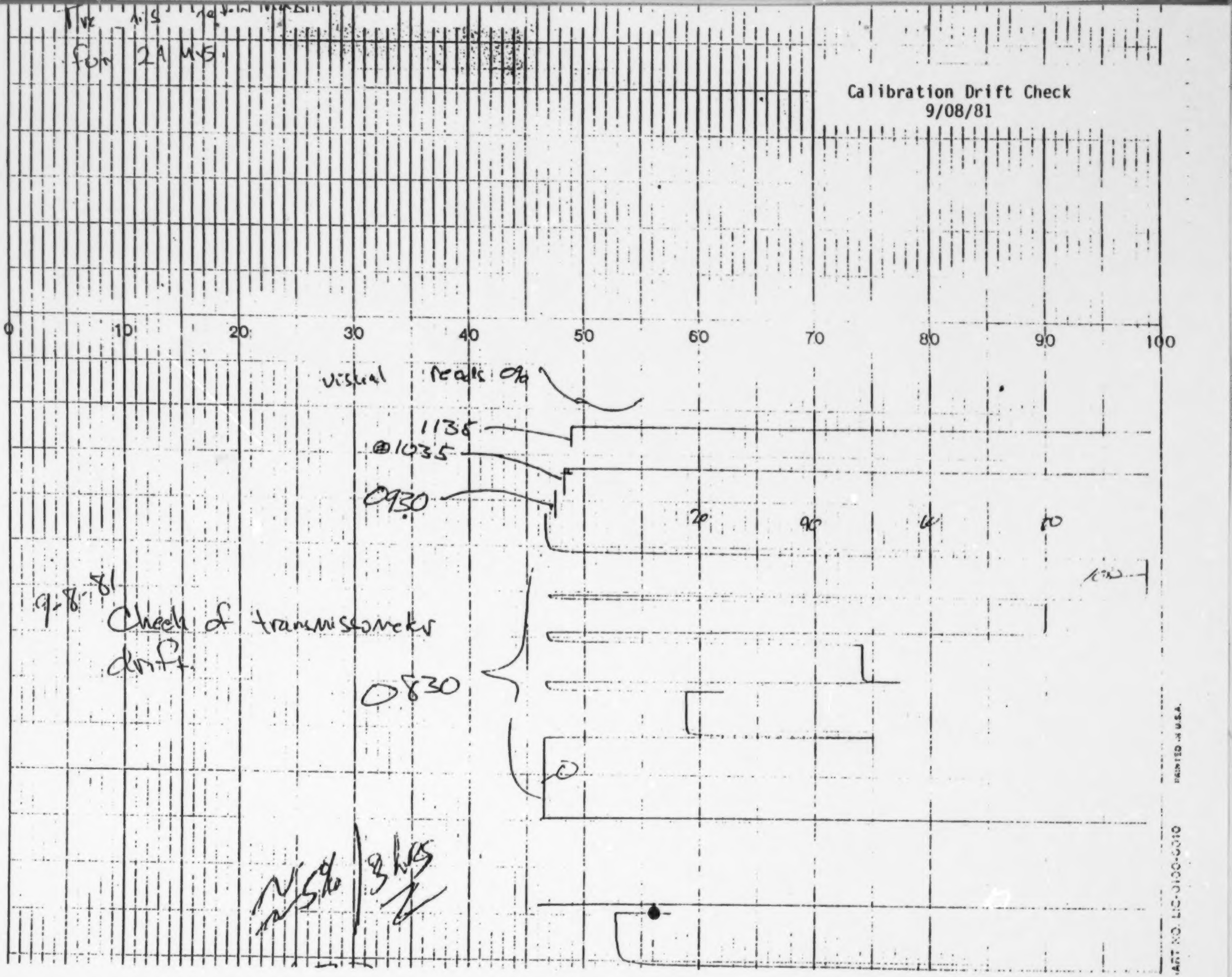
Start at 1003 (Doors open)

0900 Pre Test calibration

9-1-81
0800 Check of zero and span with no adjustment since test # 12

1439 End Test #12

VE [illegible] @ 1437 5-10%



Calibration Drift Check
9/08/81

APPENDIX D

Cost Estimates for Simplified Procedures

COST ESTIMATES FOR SIMPLIFIED PROCEDURES

Method	Capital Expenditure[a]		Estimated Labor Costs[b]	
	Item	Cost	Per Run[c]	Per Series[d] (9 tests)
•Total Particulate	Sample Unit	5400	3 persons x 2.5 days: $2,100	3 persons x 3.5 weeks: $14,700
	Extra glassware	600		
	Laboratory balance	1000		
	Platform balance	1000		
	CO analyzer	3500		
	CO_2 analyzer	3500		
	O_2 analyzer	3500		
	Recorder system	1500		
	Calibration gases 9 at $50	450		
		$20450		
If flow measurement system is used instead of stoichiometric balance then delete:				
	Gaseous analyzers, recorder, and gases	-12450		
Then add:	orsat/low velocity flow measurement system	+ 3000		
	Net difference	- 9450		
	Balance	$11000		
•Filterable Particulate	Same as Total Particulate		Subtract 1 manday: $1,900	Subtract 1.5 manweek: $12,600

---

[a] Only major items listed.

[b] at $35.00/hour

[c] Includes time for instrument calibration, laboratory analysis, data analysis, and reporting; includes time for additional person to monitor stove if required.

[d] Cost generally less since instrument calibration, data analysis, etc. is spread out over more runs and time required does not increase proportionally for number of runs conducted.

Method	Capital Expenditure[a]		Estimated Labor Costs[b]	
	Item	Cost	Per Run[c]	Per Series[d] (9 tests)
• High Volume	Sampler	2000	3 persons x 2.25 days: $1,900	3 persons x 3 weeks: $12,600
	CO Analyzer	3500		
	CO_2 Analyzer	3500		
	O_2 Analyzer	3500		
	Recorder system	1500		
	Laboratory balance	1000		
	Platform balance	1000		
	Calibration gases 9 at $50	450		
		$16450		
• Carbon monoxide	CO Monitor	3500	1 person x 2 days: $ 560	1 person x 3 weeks: $ 4,200
	CO_2 Monitor	3500		
	O_2 Monitor	3500		
	Recorder system	1500		
	Platform balance	1000		
	Calibration gases 9 at $50	450		
		$13450		
As Screening Method				
	Orsat	500	1 person x 1 day: $ 280	
	OR			
	CO/CO_2 Analyzer	2500		
	Calibration gases 2 at $50	100		
		$600-2,600		
• Total Hydrocarbon	Same as Carbon monoxide	13450	1 person x 2 days: $ 560	1 person x 3 weeks: $ 4,200
	Flame ionization detector	4000-10,000*		
		$23450		
As Screening Method				
	Orsat OR	500	1 person x 1 day: $ 280	
	CO Analyzer	2500.		
	Flame ionization detector	4000		
	Calibration gases	200		
		$700-6700		

* High quality heated unit.

Method	Capital Expenditure[a]		Estimated Labor Costs[b]	
	Item	Cost	Per Run[c]	Per Series[d] (9 tests)
Opacity	Opacity meter	500	1 person x 1 day: $ 280	1 person x 2 weeks: $2,800
	Recorder system	500		
	Calibration filters	50		
		$1050		
Creosote	Laboratory balance	$1000	1 person x 1 day: $ 280	1 person x 2 weeks: $2,800
Smoke Spot	Smoke meter	$ 75	1 person x 1 day: $ 280	1 person x 2 weeks: $2,800

RESIDENTIAL WOOD COMBUSTION STUDY

TASK 5

EMISSIONS TESTING OF WOOD STOVES

Volume 4 of 4

APPENDIX E

Index

Data forms are presented sequentially by run number and are indexed within runs as follows:

1. Operating Parameters
2. Oregon Method 7 Sampling Data
3. Oregon Method 7 Sample Recovery Data
4. Laboratory Total Particulate Calculations
5. Flue Gas Exhaust Plume Evaluation
6. Bacharach Smoke Spot
7. Orsat Data
8. Moisture Data
9. Wood Moisture

Pg. 1

Operating Parameters

Run # 1 Date 7/21/81 Clock Time (24 H) ______ Operator [illegible]

Stove Name ______

Fuel: Initial Charge (lb) 22.8 Remaining Coal Bed (lb) 2.0 (1330)

Test Charge 7 pieces 24.1 lb; Kindling 5 pieces 2.1 lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES Combustion Air	Combustion Chamber #8	Stove Surface	Opacity Meter #7	Catalyst Pre	Catalyst Post	NDIR CO %	NDIR CO₂ %	NDIR HC ppm	Opacity	Comments (Footnotes)
												@13:45 22.8 lb initial Charge
1330		76°	335	240	113							[illegible]
1356 0	26.2 (lb)			200°				.45	4.9	200		Start of Run Damper Full Open
5	24.8			270°				.75	9.0	150		Closed Damper and opened 1/ Turn
10	21.8			440°				1.5	8.0	200		Close Damper 3/4 Turn (1/4 Open)
12	21.3			480°				1.57	7.2	340		
13.5	21.0			490°				1.10	7.2	250		
15.0	20.8			485°				1.19	7.2	275		
20.0	19.8			460°				1.15	7.0	300		
25.0	19.0			440°				1.25	6.5	295		
30.0	18.2			420°				1.1	6.5	300	40%	
35.0	17.5			415°				1.0	6.0	275	45%	Dampered to 1/8 Turn open
40.0	17.0			415°				1.4	5.5	295	30%	

Comment Number:

pg. 2 of ___

Operating Parameters

Run # I Date 7/21/81 Clock Time (24 H) ________ Operator [illegible]

Stove Name ________

Fuel: Initial Charge (lb) ________ . Remaining Coal Bed (lb) ________

Test Charge ________ pieces ________ lb; Kindling ________ pieces ________ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	Opacity Meter	Catalyst		CO %	CO_2 %	HC ppm		
						Pre	Post					
45	16.4		488°	370°				1.25	5.0	250	30%	
50	15.9		485°	350°				1.10	4.5	250	35%	
55	15.4		491°	340°				1.20	5.0	275	35%	
60	14.9		495°	340°				1.20	4.8	300	37%	
65	14.4		494°	330°				1.2	4.8	275	37%	
72.0	13.8		500°	320°				1.5	5.25	310	40%	Phase II
75.0	13.6		495°	320°				1.3	4.8	300	40%	
82.0	12.9		492°	315				1.25	4.5	300	40%	
85.0	12.6		490°	315				1.30	4.8	300	40%	
90.0	12.2		487	310°				1.3	4.6	310	43%	
103.0	11.5		530	325				.90	5.0	290	40%	
107.0	11.0		515	330°				.95	5.2	290	40%	
110.0	10.7		504	330°				1.0	5.0	300	30%	

Comment Number:

Operating Parameters

Run # 1 PH2 Date 2/21/81 Clock Time (24 H) ______ Operator [illegible]

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	Opacity Meter	Catalyst Pre	Catalyst Post	CO %	CO_2 %	HC ppm		
116	10.4		497°	330°				1.0	4.6	300	30%	
120	10.0		491°	325°				.85	3.5	250	35%	
125	9.7		487°	320°				1.0	4.0	275	30%	
130	9.4		478°	310°				1.05	4.0	260	30%	open to 1/4 turn
135	8.9		472°	300°				.90	3.5	250	30%	
140	8.7		465°	300°				.90	3.5	250	38%	open to 1/2 turn
145	8.3		446°	290°				.88	3.2	250		
150	8.0		514°	300				.50	4.8	225	35%	
155	7.5		521	310°				.50	4.0	210	40%	
160	7.1		497	320				.575	3.75	225	50%	
165	6.5		593	350				.70	5.0	250	30%	DAMPER down to 1/4 turn open
170	6.2		539	380				.65	5.2	260	50%	
175	5.8		530	385				.75	5.0	300		

Comment Number:

page 4 of

Operating Parameters

Run # 1 Date 7/21/81 Clock Time (24 H) ____ Operator [illegible]

Stove Name ____

Fuel: Initial Charge (lb) ____ Remaining Coal Bed (lb) ____

Test Charge ____ pieces ____ lb; Kindling ____ pieces ____ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	Opacity Meter	Catalyst Pre	Catalyst Post	CO %	CO₂ %	HC ppm		
180	5.4		492°	380°				.70	4.9	260	36%	
185	5.2		486	380				.79	5.0	250	30%	
191	4.9		453	350				.85	4.2	250	20%	
197	4.7		466	340				.80	3.8	200	20%	
202	4.6		449	330				1.2	5.0	190	12%	
207	4.6		451	320				1.3	5.0	175	15%	
212	4.4		441	310				.82	3.8	150	10%	
217	4.3		443	300				.72	3.5	140	10%	
225	4.1		428	300				.82	3.8	120	10%	Damper to 1/2 Turn Open
230	4.0		428	300				.90	4.0	120	10%	
237	3.8		415	295				.80	3.25	120	10%	
242	3.6		411	295				.70	2.9	150	20%	
247	3.5		423	290				1.0	3.8	150	20%	

Comment Number:

page 5 of ___

Operating Parameters

Run # 1 Date 7/21/81 Clock Time (24 H) ________ Operator DSM

Stove Name ________

Fuel: Initial Charge (lb) ________ Remaining Coal Bed (lb) ________

Test Charge ________ pieces ________ lb; Kindling ________ pieces ________ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	Opacity Meter	Catalyst Pre	Catalyst Post	CO %	CO_2 %	HC ppm		
252	3.3		436	290°				.95	3.5	160	20%	
257	3.3		437	285				1.0	3.25	160	20%	~~opened~~
261	3.2		437	280				.95	3.25	170	20%	opened to 3/4 turns open
267	3.0		399	280				.90	3.6	200	20%	
272	2.7		420	280				.60	3.8	150	20%	
277	2.5		436	295				.70	4.2	190	20%	
2												

Comment Number:

pg. 1 - ___

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ 1.84 Date 7/21/81 Train Operators DLP, GEN, PET

Run # 1 Phase # 1 Clock Time (24 H) 1355-1502

Sample Box # NAPP 1 Stack Dimensions 8" Ø

Probe Length 6' Barometric Pressure 29.96" Hg -Cp = .803

Probe Material GLASS Nozzle Diameter 0.405" Ø

STACK #7 #8

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			%m ↓	Comments	
			Calc.	Act.		T in	T out			Imp.	WB	DB		Top T	Chimney T
0	115.370	.003	.03	.04	292	80	79	0	310	74	160	560		361	483
2.5		.005	.06	.06	467								22		
5	116.12	.007	.07	.07	641	80	79		315	75				427	650
10	116.81	.003	.03	.03	573	80	80		296	82				337	676
15	117.14	.002	.02	.03	423	80	80	0	300	79	138	325	13	295	583
20	117.45	.001	.01	.02	371	80	80		308	77				262	576
25	117.75	.001	.01	.02	345	81	83	0	314	77				236	525
30	117.98	.001	.01	.02	345	81	83	0	321	77				234	525
35	118.05	.001	.01	.02	326	82	84	.	301	84			14	220	578
40	118.19	.001	.01	.01	277	83	84	0	297	87				191	498
45	118.34	.001	.01	.01	274	83	85		280	85				186	492
50	118.48	.002	.03	.03	270	83	85	0	292	78				186	488
55	119.95	.002	.03	.03	269	83	84	0	301	75	122	240	9	(?) 99	491
60	119.07	.002	.03	.03	265	83	85			76				178	492
65	119.43	.002	.03	.03	252	83	85		284	84				182	498
68	119.615														

0.45 5-10

Lkck @ ~1840 hrs < .02 CFM @ 14" Hg

pa_ 1 .. 2

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ 1.84 Date 7/21/81 Train Operators DCP, Gen, Pet
Run # 1 Phase # 2 Clock Time (24 H) 1507-1834
Sample Box # Napp 2 Stack Dimensions 8" Ø
Probe Length 3' Barometric Pressure 29.95"Hg
Probe Material Glass Nozzle Diameter 0.502"Ø

Cp = .824

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments		
			Calc.	Act.		T in	T out			Imp.	WB	DB	%M ↓	#7 Flue (Top)	#8 Chamber
68	119.615	.002	.10	.10	148	85	86	0	274	82			[illegible]	173	504
71	119.93	.002	.10	.10	212	85	86	0	283	78	120	220	8		
75	120.71	.001	.05	.05	240	86	86	0	291	69				171	490
83	121.35	.001	.05	.05	234	86	87	0	299	72				167	491
*90	121.94	.002	.09	.09	234	85	87	0	305	72				172	499
95	122.78	.002	.09	.09	252	86	87		306	69				184	517
100	123.45	.001	.05	.05	250	86	87		306	71				194	530
105	123.81	.002	.09	.09	244	86	87	0	307	74				189	514
110	124.50	.002	.09	.09	240	86	87		307	72	120	240	8	182	500
115	125.23	.003	.14	.14	235	86	87		307	70				164	494
120	126.25	.002	.09	.09	233	87	88	0	307	70				172	488
125	127.01	.002	.09	.09	230	88	87		308	73				167	478
130	127.70	.002	.09	.09	230	86	88		308	75				167	473
135	128.18	.003	.14	.14	234	87	89		308	72			7	163	466
140	129.27	.002	.09	.09	237	87	88		307	71				173	462

1.38 3.45 1290 1307

2ND attempt (#5 coupon) *

2ND + coupon put in (full) 2ND coupon

81

82^

pa. 2 3

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ ______ Date 7/21/81 Train Operators ______
Run # 1 Phase # 2 Clock Time (24 H) ______
Sample Box # ______ Stack Dimensions ______
Probe Length ______ Barometric Pressure ______
Probe Material ______ Nozzle Diameter ______

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments		
			Calc.	Act.		T in	T out			Imp.	WB	DB	%M ✓	#7 ✓	#8 ✓
145	129.93	.002	.09	.09	259	88	87		307	74				[illegible]	526
150	130.51	.002	.09	.09	263	88	87	0	308	74				206	528
155	131.24	.003	.14	.14	256	87	88	1.5	308	74				205	493
165	132.19	.002	.09	.09	274	87	88	5	309	77				190	537
170	132.95	.002	.09	.09	254	87	88	7	309	76	@1648 hrs			177	504
175	133.82	.002	.09	.09	242	87	88	7.5	309	74	126	260	9	178	495
180	134.	.002	.09	.09	230	87	88	8	309	75				166	489
185.5	135.57	.002	.09	.09	224	88	89	8.5	309	74					470
190	136.36	.002	.09	.09	212	88	88	9	307	75				165	454
195	137.22	.002	.09	.09	212	87	88	9	307	75				154	460
200	138.00	.002	.09	.09	211	87	88	9.5	308	75				160	443
205	138.93	.002	.09	.09	210	87	88	9.5	307	74				154	448
210	139.53	.002	.09	.09	205	87	88	.	305	75				158	444
215	140.68	.002	.09	.09	200	87	88	9.5	305	76				159	442
221	141.69	.002	.09	.09	205	87	88	10.5	306	75				147	428
				[illegible]	3437	1309	1317	[illegible]							

pa. 3 .. 5

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ ______ Date 7/21/81 Train Operators ______

Run # 1 Phase # 2 Clock Time (24 H) ______

Sample Box # ______ Stack Dimensions ______

Probe Length ______ Barometric Pressure ______

Probe Material ______ Nozzle Diameter ______

180
53
233

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments
			Calc.	Act.		T in	T out			Imp.	WB	DB	
225	142.39	.002	.09	.09	218	87	88	10	308	74			153 422
230	143.36	.002	.09	.09	218	87	88	10	308	75	106	212	4 173 406
235	144	.002	.10	.10	219	87	88	10.5	307	75			167 419
240	145.09	.002	.10	.10	216	87	88	12.5	308	75			165 422
250	146.76	.002	.10	.10	220	87	88	13	306	77			159 440
255	147.51	.002	.10	.10	219	87	88	13	307	77			162 431
260	148.33	.002	.10	.10	229	87	88	14	308	77			171 403
265	149.	.002	.10	.10	243	87	88	14.5	308	77			163 421
270	149.90	.002	.10	.10	257	87	88	14.5	308	77			190 434
275	150.524			0.88	2037	783	792						

post leak check 2.02 CFM @ 15" Hg

Oregon Method 7 Sample Recovery Data Sheet

Stove Name ________ Date 7/21/81

Run # 1 Phase # 1 Clock Times (24 H) ________

Box # NAppo #1

CONDENSED WATER DETERMINATION

Impinger:	#1	#2	#3	#4	Total Condensate
Final Weight	534.4	539.8	428.4	765.9	
Initial Weight	533.1	539.6	428.3	760.7	
Net Weight	1.30	0.2	0.1	5.2	6.80 Total
		1.60			

FILTER IDENTIFICATIONS

Front Filter-First Filter # 052 Back Filter-First Filter # 220

Front Filter-Second Filter # ____ Back Filter-Second Filter # ____

WASH IDENTIFICATION

Probe/Front Filter Wash ________

Impinger Wash ________

Blank ________

CREOSOTE COUPONS

Plate Location Top Plate Location Bottom

Plate Identification #1 Plate Identification #2

	Date	Mg	Date	Mg
Tape				
Final				
Net				

#1 98mL

#2 100mL

Oregon Method 7 Sample Recovery Data Sheet

Stove Name ______ Date 7/21/81

Run # 1 Phase # 2 Clock Times (24 H) ______

Box # NBpp 2

CONDENSED WATER DETERMINATION

Impinger:	#1	#2	#3	#4	Total Condensate
Final Weight	552.9	533.0	430.1	731.4	
Initial Weight	529.6	531.8	429.0	724.5	
Net Weight	23.3	1.2 25.60	1.1	6.9	32.5 total

FILTER IDENTIFICATIONS

Front Filter-First Filter # 055 Back Filter-First Filter # 218

Front Filter-Second Filter # ____ Back Filter-Second Filter # ____

WASH IDENTIFICATION

Probe/Front Filter Wash ______

Impinger Wash ______

Blank ______

CREOSOTE COUPONS

Plate Location (no top location) Plate Location #5

Plate Identification ______ Plate Identification Bottom

(Put in ~ 100 minutes + 1538 hrs)

Removed @ 2500 Hrs

Tare

Date	Mg	Date	Mg

Final

Date	Mg	Date	Mg
Net			

#1 - 122 ml

#2 102 ml

#3 - NA

Q2 9

P 5, [illegible] 0.823
F 5, [illegible] 0.803

Laboratory Total Particulate Calculations

Stove Name PS048
Date of Sampling 7/21/81
Run # 1
Phase # 1
Date of Analysis
Box # 1
Analyst

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 152 (ml) of Acetone
Final 72.6150 (mg) - Tare 72.5866 (mg) net 28.4 mg
- Blank ((.009 mg/ml)(152 ml) = 1.368 mg) = 27.032 mg

II. Filter catch(es). F# 052 B# 220
Front filter Final 0.4831 (mg) - Tare 0.4666 (mg) 0.0165
+ Back-up filter Final 0.1670 (mg) - Tare 0.1532 (mg) = 0.0138 mg
Total 0.0303

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2 CL2 75 ml
Final 74.1305 (mg) - Tare 74.1237 (mg) net 6.8 mg
- Blank ((.0025 mg/ml)(75 ml) = .1875 mg) = 6.6125 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.

sampling
[illegible]
lab. analysis sheet

Final 70.8349 (mg) - Tare 70.8310 (mg) net 3.9 mg
- Blank ((.006 mg/ml)(205 ml total ~~mg~~
- ~~6.80~~ 1.6 ml condensed = ~~198.2~~ 203.4 ml) = ~~[illegible]~~ 1.22 mg) = ~~2.711~~ 2.68 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Acetone 190 ml
Final 69.8171 (mg) - Tare 69.7891 (mg) net 28.0 mg
- Blank ((0.009 mg/ml)(190 ml) = 1.71 mg) = 26.29 mg

VI. Other particulate catches. = – mg

VII. Total particulate = I+II+III+IV+V+VI = 92.9~~5~~2 mg

Blanks

Acetone Final 73.3076 (mg) - Tare 73.3067 (mg) net 0.9 mg /100 ml
= 0.9 mg/ 100 ml = .009 mg/ml

Methylene chloride Final 72.2783 (mg) - Tare 72.2781 (mg) net 0.2 mg /80 ml
= 0.2 mg/ 80 ml = .0025 mg/ml

Water Final 73.6270 (mg) - Tare 73.6264 (mg) net 0.6 mg /100 ml
= 0.6 mg/ 100 ml = .006 mg/ml

Other Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Laboratory Total Particulate Calculations

Stove Name DS048
Date of Sampling 7/21/81
Run # 1
Phase # 2
Date of Analysis
Box # 2
Analyst

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 202 (ml) of Acetone
Final 71.6483 (mg) - Tare 71.3014 (mg) net 346.9 mg
- Blank ((0.009 mg/ml)(202 ml) = 1.818 mg) = 345.08 mg

II. Filter catch(es). F#055 B# 218
Front filter Final 0.5252 (mg) - Tare 0.4656 (mg) 0.0596
+ Back-up filter Final 0.4747 (mg) - Tare 0.1514 (mg) = 0.3233 mg
total 0.3829 mg

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2 CL 2 85 ml
Final ~~69.9491~~ (mg) - Tare ~~69.7794~~ (mg) net ~~169.7~~ 272.4 mg
- Blank((.0025 mg/ml)(85 ml) = 0.2125 mg) = 272.18 mg
73.5705 73.2981

IV. Particulate from evaporation of water in impinger and bubblers following extraction.

Final 69.9491 (mg) - Tare 69.7794 (mg) net 169.7 mg
- Blank ((.006 mg/ml)(225 ml total
- ~~0.009~~ ~~32.5~~ 25.60 ml condensed = ~~192.5~~ 199.40 ml) = ~~1.155~~ 1.20 mg) = 168.54 9 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Acetone 204 ml
Final 72.9690 (mg) - Tare 72.6601 (mg) net 308.9 mg
- Blank ((0.009 mg/ml)(204 ml) = 1.836 mg) = 307.06 mg

VI. Other particulate catches. = 7 – mg

VII. Total particulate = I+II+III+IV+V+VI = ~~1485.~~ mg
1475.8

Blanks

Acetone Final______(mg) - Tare______(mg)
= ______ mg/______ ml = ______ mg/ml

Methylene chloride Final______(mg) - Tare______(mg)
= ______ mg/______ ml = ______ mg/ml

Water Final______(mg) - Tare______(mg)
= ______ mg/______ ml = ______ mg/ml

Other Final______(mg) - Tare______(mg)
= ______ mg/______ ml = ______ mg/ml

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
1:55	50	60	60	50
	—	45	40	35
	40	40	30	30
	30	—	25	20
	20	25	—	30
	50	45	50	45
	—	40	30	30
	35	25	20	15
	20	20	25	20
	25	20	20	15
	20	50	60	60
	—	45	—	40
	35	35	30	45
	50	45	40	40
35	50	55	50	45
22	40	35	35	35
	40	40	35	—
	—	35	40	40
	40	35	35	35
	—	40	35	40
	40	40	35	45
	45	45	40	40
	45	45	40	45
	40	45	45	50
	50	40	50	45
	[illegible]	[illegible]	[illegible]	[illegible]

Time	0	1/4	1/2	3/4
2:35	40	—	35	—
	35	35	35	40
	40	45	40	40
	35	35	40	35
	[illegible]	40	40	40
	40	—	45	40
	40	45	40	40
	40	40	40	45
	40	40	40	35
	35	40	35	40
	35	35	35	35
	40	35	35	40
	—	40	35	35
160°	35	35	30	30
	35	35	30	30
	35	-	—	35
	35	30	30	30
150°	30	—	35	30
	30	—	35	35
	35	35	35	30
	35	35	—	35
	35	35	35	35
	35	40	40	40
	35	—	—	35
	35	35	35	40
	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]				

Stove Name ____________

Date 7/21/81

Clock Times (24 H) ~~[illegible]~~ 1355

Run # 1

Phase # ____________

Observer Eileen May

Distance to Source 30 feet

Direction to Source SE

Wind Direction ~~[illegible]~~W - variable

Wind Velocity 0-2 MPH

Cloud Cover 30%

Plume Background green trees [illegible]

Stability poor

Relative Humidity ____________

Type Contaminant wood smoke

Color white plume

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

_____ Units No. ____________

Minutes of Observation ____________

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
1515	30	35	35	35
	35	35	35	35
	35	35	—	35
	35	35	40	35
	40	35	40	35
	40	35	35	40
	40	40	40	40
	35	35	35	40
	40	40	35	35
	35	40	40	35
	40	40	35	40
	40	40	35	40
	40	40	35	35
	35	35	35	40
01	40	35	40	40
	40	35	40	40
	35	40	40	40
	40	35	40	40
	35	—	35	40
	35	40	40	40
	40	40	35	40
	40	40	40	40
	40	40	40	40
	40	40	40	40
	40	40	45	40
	[illegible]	40	[illegible]	40
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	45	[illegible]	[illegible]	40
[illegible]	[illegible]	40	45	40
	1155	1105	[illegible]	1165

Time	0	1/4	1/2	3/4
1545	45	45	45	40
	45	—	40	45
	40	40	45	45
	45	45	45	40
	40	45	45	45
	45	40	45	45
	45	40	45	45
	45	—	45	45
	40	45	45	45
	45	45	40	45
	45	45	45	45
	40	40	40	40
	45	40	40	40
1600	40	40	40	40
	40	45	40	40
	45	40	45	40
	45	40	45	40
	40	40	40	40
	40	45	40	45
	40	40	45	45
	40	45	40	45
	45	40	40	45
	40	40	45	45
	45	40	45	40
	45	45	45	40
	40	45	45	[illegible]
	40	45	40	[illegible]
	[illegible]	[illegible]	—	[illegible]
	—	45	45	[illegible]
[illegible]	[illegible]	45	40	45
	[illegible]	[illegible]	[illegible]	[illegible]

Stove Name ______

Date 7/21/81

Clock Times (24 H) 1515

Run # 1

Phase # ______

Observer Eileen [illegible]

Distance to Source 30 feet

Direction to Source SE

Wind Direction [illegible]

Wind Velocity up to 5 MPH

Cloud Cover 0%

Plume Background [illegible]

Stability [illegible]

94

Relative Humidity ______

Type Contaminant [illegible]

Color white

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

______ Units No. ______

Minutes of Observation ______

89

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
[illegible]	[illegible]	[illegible]	45	[illegible]
	[illegible]	40	40	45
	45	40	45	40
	45	40	40	45
	40	40	40	45
	—	40	40	45
	40	40	45	40
	45	40	40	45
	40	45	40	45
	40	45	40	40
	45	40	45	40
	40	40	45	40
	40	45	40	40
	40	40	45	45
160°	45	45	45	45
	45	45	40	45
	45	45	45	45
	45	45	45	45
	45	45	45	45
	[illegible]	45	45	45
	45	40	45	45
	45	40	45	45
	40	45	40	45
	45	40	40	45
	45	40	45	45
	45	45	45	45
	40	45	–	40
	40	45	40	45
	40	45	40	45
150°	45	40	45	40
	1240	1275	1290	1310

Time	0	1/4	1/2	3/4
[illegible]	45	45	40	40
	40	45	[illegible]	40
	40	4~~5~~0	40	40
	40	40	35	35
	40	35	35	40
	35	35	35	35
	30	35	35	30
	35	35	30	30
	30	35	35	30
	30	30	30	30
	30	30	30	25
	25	25	20	20
	20	20	20	20
	20	20	20	20
145°	20	20	20	20
	25	20	320	25
	20	20	20	25
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	15	20	15	20
	15	15	15	15
	15	15	20	20
	15	15	15	15
	15	15	15 ~~20~~	15
	15	15	15	15
135°	15	15	15	15
	75	76	[illegible]	71

Stove Name ________

Date [illegible]

Clock Times (24 H) 1620

Run # 1

Phase # ________

Observer [illegible]

Distance to Source 30'

Direction to Source S E

Wind Direction west

Wind Velocity 0-5

Cloud Cover 0%

Plume Background trees, roof

Stability [illegible]

Relative Humidity ________

Type Contaminant [illegible]

Color white

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

____ Units No. ________

Minutes of Observation ________

[illegible] = 34

Bacharach Smoke Spot

Run ONE Date [illegible] Operator [illegible]

Begin [illegible] 1357
Page 1 of 1

Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value
A	1413	outlet (E) (O)	225	1
B	1445	O	150	
C*	1446	O	150	7
D	1530	outlet	150	
E*	1531	outlet	150	8
F*	1615	outlet	145	6
G	1615	"	145	
H*	1645	outlet	150	9
I	1645	"	150	
J*	1730	outlet	130	2
K	1730	outlet	130	

Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value
1	1417	[illegible] (S)		
T1	1420	Transmissometer (T)	236	
2	1447	S	270	
3*	1447	S		8
T2	1450	T		
T3*	1450	T		
4	1536	S		
5*	1537	S		5
T4	1540	T		
T5*	1541	T		
6*	1618	S	236	
7	1618	S		7
T6*	1620	T	178	
T7	162	T		

Comments: * 5 STROKES on Sample only

Bacharach Smoke Spot

Run [illegible]
Page 2 of 2

Date 7-21-81

Operator [illegible]

Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value	Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value
					8*	1655	S	242	[illegible]
					9	1655	S		
					T8*	1655	T		
					T9	1655	T		
					10	1735	S	204	
					11*	1735	S		2
					T10	1740	T	159	
					T11*	1740	T		
L	1820	outlet	145	6	12*	1825	S	~~411~~ 239	8
M*		outlet	145		13	1825	S	~~411~~ 239	
					T12*	1827	T	178	
					T13	1827	T	178	
				End test	1834				
N*	1837	outlet	145	4	14	1840	S	–	
O	1837		145 -		15*	1840	S	–	4

Comments:

* 5 strokes of pump only

O - outlet

S - sample pt (methods)

T - Transmissometer

ORSAT DATA

Stove Name - - Date 7/21/81

Run # 1 Phase # 1 and 2 Operator J. Callahan

Grab X or integrated sample

Sample Time ~~2404~~ 1304 (24 H)

	CO_2	O_2	CO	N_2	
Accumulative ~~Analysis~~ 1	9.0	19.2	19.8		
Analysis 2	↓				
Analysis 3					Wo
Average	9.0	10.2	0.6	80.2	=

Grab X or integrated sample

Sample Time 1427 (24 H)

	CO_2	O_2	CO	N_2	
Analysis 1	5.2	17.8	20.2		
Analysis 2					
Analysis 3					
Average	5.2	13.6	0.4	79.8	29.1

↓ Phase 2

Grab X ~~PPE~~ or integrated sample

Sample Time ~~1453~~ 1527 (24 H)

	CO_2	O_2	CO	N_2	
					29.2
Analysis 1	~~4.0~~				
Analysis 2	3.3	19.2	20		
Analysis 3					
Average	3.3	15.9	0.8	80	

ORSAT DATA

Stove Name ______ ______________ Date 4/21/81
Run # 1 Phase # 2 Operator J Callahan

Grab X or integrated sample ______
Sample Time 3 1555 (24 H)

Accumulative ~~Analysis 1~~	CO_2	O_2	CO	N_2	
	3.0	19.8	20.3		
Analysis 2					
Analysis 3					
Average	3.0	16.8	0.5	79.7	29.1

Grab X ~~170~~' or integrated sample ______
Sample Time 1701 (24 H)

	CO_2	O_2	CO	N_2	30.7
Analysis 1	3.4	19.6	20.2		
Analysis 2					
Analysis 3					
Average	3.4	16.2	0.6	79.8	

Grab X or integrated sample ______
Sample Time ______ (24 H)

	CO_2	O_2	CO	N_2	28.9
Analysis 1	4.2	18.8	20.2		
Analysis 2					
Analysis 3					
Average	4.2	14.6	0.4	79.8	

ORSAT DATA

Stove Name ______ Date 7/21/81
Run # 1 Phase # 2 Operator J. Callahan

Grab ______ or integrated sample ______
Sample Time 1725 (24 H)

	CO_2	O_2	CO	N_2
Analysis 1	3.2	18.6	—	—
Analysis 2				
Analysis 3				
Average	3.2	15.4	—	—

Grab ______ or integrated sample ______
Sample Time 1740 (24 H)

	CO_2	O_2	CO	N_2
Analysis 1	3.4	19.6	20.0	
Analysis 2				
Analysis 3				
Average	3.4	16.2	0.4	80

29.2

Grab ______ or integrated sample ______
Sample Time 1757 (24 H)

	CO_2	O_2	CO	N_2
Analysis 1	2.4	19.6	20.0	
Analysis 2				
Analysis 3				
Average	2.4	17.2	0.4	80.0

29.1

ORSAT DATA

Stove Name ______ Date 7/21/81

Run # 1 Phase # 2 Operator J Callahan

Grab 1820 or integrated sample ______

Sample Time ______ (24 H)

	CO_2	O_2	CO	N_2
Analysis 1	2.4	19.8	~~202~~ 202	
Analysis 2				
Analysis 3				
Average	2.4	17.4	~~0.4~~ 0.4	~~70~~ 79.8

Grab ______ or integrated sample ______

Sample Time ______ (24 H)

	CO_2	O_2	CO	N_2
Analysis 1				
Analysis 2				
Analysis 3				
Average				

Grab ______ or integrated sample ______

Sample Time ______ (24 H)

	CO_2	O_2	CO	N_2
Analysis 1				
Analysis 2				
Analysis 3				
Average				

Moisture Data

Stove Name ______ Date 7/21/81

Run # 1 Phase # ______ Operator JC

Time (24 H)	Temperature Wet Bulb	Temperature Dry Bulb	Moisture Percent
	160	560	22
	135	264	
	122	240	9
	120	220	8
	120	240	8
	116	236	
1658	126	260	9
	120	240	8
	106	212	4

Wood Moisture

Date 7/21/81 Test Run # 1

Operator J.C.

Meter Measurement

FUEL		A	B	C	D	E	F	G	H	AVE	Corrected Ave.	Gr
Not fueled ~~1~~	~~25~~	~~19~~	~~24~~	~~24~~	~~17.5~~	~~21~~	~~27~~	~~28~~	~~19.5~~	~~24~~	~~24~~	17
2	16	17.5	21	22	16	17	27	23	20		22	13
3	21	23	25	24	20	23	39	35	36		30	17
4	20	19.0	24	25	19.0	24	31	37	21		27	14.5
5	24	16.0	30	27	23	30	33	35	20		29	14
6	23	19.0	24	24	21	20	35	34	23		27	15
7	15	21	24	23	17.5	21	25	28	19		24	16
8	22	19.0	23	24	18.5	20	22	23	18		22	14
9												
10											25.9	
11												
12												
Kindling												

Length ≈ 13-15 inches

Total Mass ____________
including kindling

Percent Moisture 25.9%

Total Mass (Dry Basis) ________

Kindling Mass ________

pa 1 - 4

Operating Parameters

Run # 2 Date 7/22/81 Clock Time (24 H) 1301 Operator SSM

Stove Name

Fuel: Initial Charge (lb) 29.6 lbs Remaining Coal Bed (lb) 2.2(lbs)

Test Charge 27.4 lbs pieces 10 pieces lb; Kindling 1.7 lbs pieces 5 or 6 pieces

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	Opacity Meter	Catalyst Pre	Catalyst Post	CO %	CO₂ %	HC ppm		
1301 / 0	27.4 (lbs)											Beginning of Run 2 DAMPER WIDE OPEN
4	25.8		470°	400°				.6	12	185	80%	DAMPER to 3/4 turn open
10	24.5		503	420				1	6	350	95%	DAMPER TO 1/2 turn OPEN
15	23.0		497	450				1.5	7.0	490	95%	
20	22.1		544	460				1.7	7.5	430	95%	
25	20.7		579	510				1.6	8.0	350	90%	DAMPERED @ 1:25 to 1/4 turn open
30	19.8		534.0	525				1.5	7.5	350	95%	
35	19.2		664	500				1.7	9.0	425	95%	@ 1:33 DAMPER to 1/8 turn
40	18.0		625	510				1.3	7.5	340	90%	
48	16.4		620	550				1.1	7.0	325	95%	Charge over @ 17.6 lbs → 13:43
50	16.2		623	540				1.0	7.0	300	95%	Closed Damper @ 1:52
55	15.5		540	525				1.0	6.5	300	55%	Changed Coupons at 1:3:50
60	15.1		534	500				1.1	7.0	400	55%	

Comment Number: NDIR → Re-scaled to CAL-GASES

High Opacity Reads apparently caused by light blockage from coupon

page 2 of 4

Operating Parameters

Run # 2 Date 7/22/81 Clock Time (24 H) ________ Operator ________

Stove Name ________

Fuel: Initial Charge (lb) ________ Remaining Coal Bed (lb) ________

Test Charge ________ pieces ________ lb; Kindling ________ pieces ________ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	Opacity Meter	Catalyst Pre	Catalyst Post	CO %	CO_2 %	HC ppm		
65	14.8		531	470				1.2	7.0	400	60%	open DAMPER to 1/8 turn open @ 2:05
70	13.9		572	450				1.2	7.0	400	55%	Closed DAMPER @ 2:10
75	13.2		510	430				1.4	6.5	440	60%	
80	12.9		500	440				1.3	7.0	440	60%	Open to 1/10 turn @ 14:20
85	12.3		545	435				1.35	7.5	450	60%	
90	11.7		524	450				1.45	7.0	500	60%	
95	11.3		539	440				1.3	7.0	450	60%	
100	10.6		530	435				1.3	7.0	450	70%	
105	10.1		517	430				1.3	6.5	475	70%	
110	9.4		524	440				1.3	6.0	450	70%	
115	8.9		549	430				1.6	7.0	575	65%	
120	8.5		528	450				.85	4.0	375	65%	
125	8.0		511	470				1.0	3.6	350	60%	

Comment Number:

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Operating Parameters

Run # 2 Date 7/22/81 Clock Time (24 H) ______ Operator [illegible]

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

	Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
			Combustion Air	Combustion Chamber	Stove Surface	Opacity Meter	Catalyst Pre	Catalyst Post	CO %	CO_2 %	HC ppm		
10	130	7.5		554	440				.70	3.5	300	55%	
:15	136	7.2		547	430				.70	3.6	300		3:15 Closed Damper
	140	6.9		559	420				.65	3.6	290	55%	
	145	6.6		550	420				.70	3.6	275	55%	
	150	6.2		544	420				.80	3.4	260	55%	
	155	6.0		541	415				.72	3.4	250	50%	
	160	5.6		567	410				.65	3.6	210	50%	
	165	5.5		568	405				.70	3.6	220	50%	
	170	5.2		577	400				.65	3.0	210	45%	
	175	4.9		574	400				.70	3.6	200	50%	opened doors & POKED FIRE
[illegible]	180	4.6		550	430				.75	3.6	275	50%	
	185	4.4		530	430				.75	3.4	250	45%	
	190	4.2		527	410				.70	3.0	200	40%	

Comment Number:

page 4 of 4

Operating Parameters

Run # 2 Date 7/22/81 Clock Time (24 H) 13:15 Operator SPM

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	Opacity Meter	Catalyst Pre	Catalyst Post	CO %	CO_2 %	HC ppm		
195	4.1		519	400				.65	3.0	175	40%	
200	3.9		521	400				.65	3.0	150	40%	
205	3.8		521	390				.50	2.5	150	40%	
210	3.7		518	390				.55	2.5	140	35%	
215	3.6		513	380				.58	3.0	125	36%	
220	3.5		514	380				.62	3.0	125	35%	
225	3.3		524	390				.55	3.0	100	35%	
232	3.2		526	370				.5	2.5	100	30%	
240	2.9		543	370				.62	3.0	100	30%	Opened 1/8 turn @ 237 min
245	2.7		550	380				.65	3.0	110	35%	
250	2.6		547	380				.60	3.0	100	35%	
254	2.5		541	380				.60	3.0	100	35%	(End of Burn)

Comment Number: Opacity Transmissometer apparently dirty or out of Calibration

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ 1.84 Date 7/22/81 Train Operators DLP, GEN, PET

Run # 2 Phase # 1 Clock Time (24 H) 1300 – 1342

Sample Box # NAPP#1 Stack Dimensions 8" ∅

Probe Length 6' Barometric Pressure 29.91 "Hg

Probe Material GLASS Nozzle Diameter 0.502 " ∅

post Leak check < .02CFM @ 15" Hg VAC.

assumed 22gm INITIAL

Elapsed Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments		
			Calc.	Act.		T in	T out			Imp.	WB	DB	gm	#7	#8
0	151.765	.010	.22	.22	770	82	81	0	299	74				627	1228
4	152.64	.004	.09	.09	585	81	81	0	297	72			20	321	470
6	152.85	.003	.07	.07	487	81	82	0	298	73				309	
10	153.43	.003	.08	.08	387	82	81	0	301	76				303	
15	154.13	.002	.05	.05	348	82	81	0	301	75				240	
20	154.54	.004	.11	.11	373	82	81	0	300	77				277	
25	155.25	.003	.08	.08	366	82	83	0	301	75				256	
30	155.84	.003	.08	.08	317	83	84	0	301	74			16	220	533
35	156.42	.003	.10	.10	353	83	84	0	300	74				256	
40	157.07	.003	.10	.10	385	84	85		303	73				281	
42	157.381				437!										
s/s															
changed bottle (phenol) @ 17.6															

103<

pa. 1 2

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ 1.84 Date 7/22/81 Train Operators DLP, GEN
Run # 2 Phase # 2 Clock Time (24 H) 1346–1714
Sample Box # 2 Stack Dimensions 8"Ø
Probe Length 3' Barometric Pressure 29.92" Hg
Probe Material Glass Nozzle Diameter ~~[illegible]~~ .405"Ø

9.m

Elapsed Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			↓	Comments
			Calc.	Act.		T in	T out			Imp.	WB	DB		
42	157.381	.003	.05	.05	301	87	86	0						
45	158.12	.003	.05	.05	292	87	86	0	298	74			16	230 624
50	158.43	.003	.05	.05	307	89	87	0	300	75				207
55	158.87	.002	.05	.05	278	88	87		299	77				183
61	159.42	.002	.05	.05	268	88	87		361	78				188
67	159.96	.001	.05	.05	275	88	87		301	75				186 558
75	160.68	.001	.05	.05	257	87	89		301	75			16	177
80	161.13	.002	.03	.03	269	87	88	0	299	75				186
85	161.50	.002	.03	.03	269	87	88	0	300	75				179
93	161.93	.002	.03	.03	273	87	89		361	77				189
100	162.57	.002	.03	.03	279	88	89		301	77				193 577
108	163.02	.002	.03	.03	266	87	89		300	77				188
116	163.43	.001	.02	.03	304	88	89	0	298	78				~~[illegible]~~ 199
120	163.64	.003	.05	.05	277	88	89	0	302	78				178
129	164.73	.002	.03	.03	265	88	89	0	300	74				180

1140 2633

30 49 29 0 15 12. 33 180 46 10 1 80 19 pa. 2 2 180 28 08

Oregon Method 7 Sampling Data Sheet

Stove Name ____ H@ ____ Date 7/22/81 Train Operators DLP
Run # 2 Phase # 2 Clock Time (24 H) ____
Sample Box # 2 Stack Dimensions ____ 180 35 15
Probe Length ____ Barometric Pressure ____
Probe Material ____ Nozzle Diameter ____

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments
			Calc.	Act.		T in	T out			Imp.	WB	DB	
135	165.10	.002	.03	.07	261	88	90	0	298	74			180 556
3 [illegible]	166.62	.001	.02	.02	255	88	89	0	300	77			8 178
166	167.44	.001	.02	.02	261	90	88	0	302	78			174
182	168.45	.002	.03	.03	254	90	88		301	80			174
191	169.01	.002	.03	.03	251	88	90	0	302	78			166 524
199	169.54	.002	.09	.09	247	88	90	0	301	78			163
208	170.31	.002	.10	.10	250	89	91	4	299	78			5 171
215	171.34	.002	.10	.10	246	89	90	5.5	298	78			165 516
229	174.06	.002	.10	.10	240	90	91	5.5	295	78			4 167
231	175.59	.003	.15	.15	273	90	91	6.5	298	77			199
246	177.81	.003	.15	.15	278	90	91	6	300	76			194
250	178.676			0.0	2616								
								Leak Post check < .02 @ 14" Hg Vac.					

Oregon Method 7 Sample Recovery Data Sheet

Stove Name ______ Date 7/22/81
Run # 2 Phase # 1 Clock Times (24 H) 1300-1342
Box # 1

CONDENSED WATER DETERMINATION

Impinger:	#1 11 ml	#2 110 ml	#3	#4	Total Condensate
Final Weight	560.4	546.9	428.6	768.4	total 25.07
Initial Weight	540.9	545.2	427.9	764.6	
Net Weight	19.5	1.7	0.7	3.8	
		21.90			

FILTER IDENTIFICATIONS

Front Filter-First Filter # 069 Back Filter-First Filter # 201
Front Filter-Second Filter # ____ Back Filter-Second Filter # ____

WASH IDENTIFICATION

Probe/Front Filter Wash ______
Impinger Wash ______
Blank ______

CREOSOTE COUPONS

Plate Location TRANSMISSOMETER Plate Location Sampling Port
Plate Identification #3 Plate Identification #4

Tape

	Date	Mg	Date	Mg
Final				
Net				

#1 124 mL
#2 104 mL
#3 1 mL

Oregon Method 7 Sample Recovery Data Sheet

Stove Name — ______ Date 7/22/81

Run # 2 Phase # 2 Clock Times (24 H) 1346-1714

Box # 2

CONDENSED WATER DETERMINATION

Impinger:	#1 112	#2 46	#3	#4	Total Condensate
Final Weight	558.9	528.3	429.9	736.2	
Initial Weight	540.1	527.0	428.7	731.4	
Net Weight	18.8	1.3	1.2	4.8	total 26.1
		21.3			

FILTER IDENTIFICATIONS

Front Filter-First Filter # 068 Back Filter-First Filter # 202

Front Filter-Second Filter # ____ Back Filter-Second Filter # ____

WASH IDENTIFICATION

Probe/Front Filter Wash ______

Impinger Wash ______

Blank ______

CREOSOTE COUPONS

Plate Location TRANS. Plate Location SAMPLE PORT

Plate Identification III Plate Identification VII

	Date	Mg	Date	Mg
Tape				
Final				
Net				

#1 - 130ml

#2 - 94ml

#3 —

Laboratory Total Particulate Calculations

Stove Name ______________________ Date of Sampling 7/22/81
Run # 2 Phase # 1 Date of Analysis ______________
Box # 1 Analyst ______________

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 187 ml ~~[illegible]~~ (ml) of Acton
Final ~~[illegible]~~ (mg) - Tare ~~71.3557~~ (mg) 198.7 net ~~[illegible]~~ mg
- Blank ((.009 mg/ml)(187 ml) = 1.683 mg) = 197.02 mg

70.5615 70.3628

II. Filter catch(es). F# 201 B# 069
~~Sxt~~ ~~Front~~ filter Final 0.4895 (mg) - Tare 0.1524 (mg) 0.3371 g
Rm Part ~~Back~~ up filter Final ~~0.5293~~ 0.5293 (mg) - Tare 0.4664 (mg) = 0.0629 mg
total 0.4000 g

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2CL2 85 ml
Final 70.4618 (mg) - Tare 70.3368 (mg) net 125.0 mg
- Blank((.0025 mg/ml)(85 ml) = 0.2125 mg) = 124.79 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.

Final 70.2034 (mg) - Tare 70.0924 (mg) net 111.0 mg
- Blank ((.006 mg/ml)(233 ml total
- ~~25.07~~ 21.9 ml condensed = 207.93 ml) = ~~1.248~~ 1.27 mg) = 109.7~~8~~3 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Acetone 223 ml
Final 73.2361 (mg) - Tare 72.9792 (mg) net 256.9 mg
- Blank ((.009 mg/ml)(223 ml) = 2.007 mg) = 254.89 mg

VI. Other particulate catches. = – mg

VII. Total particulate = I+II+III+IV+V+VI = 1086.45 mg

Blanks

Acetone Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Methylene chloride Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Water Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Other Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Laboratory Total Particulate Calculations

Stove Name ______ Date of Sampling 7/22/81
Run # 2 Phase # 2 Date of Analysis ______
Box # 2 Analyst ______

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 211 (ml) of Acetone net
Final 71.6548 (mg) - Tare 71.3357 (mg) 319. mg
- Blank ((.009 mg/ml)(211 ml) = 21.899 mg) = 317.20 mg

II. Filter catch(es). F#068 B#202
RMN ~~Front~~ filter Back Final 0.5263 (mg) - Tare 0.1516 (mg) net 0.3747
+ Back-up filter Front Final 0.5273 (mg) - Tare 0.4667 (mg) = 0.0606 mg
Total 0.4353

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2CL2 85 ml
Final 73.8526 (mg) - Tare 73.6548 (mg) net 197.8 mg
- Blank ((.0025 mg/ml)(85 ml) = 0.2125 mg) = 197.59 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.

Final 72.5427 (mg) - Tare 72.4513 (mg) net 91.4 mg
- Blank ((.006 mg/ml)(226 ml total
- 26.1 ml condensed = 199.9 ml) = ~~1.199~~ mg) = ~~90.20~~ mg
21.3 2.047 89.35

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Acetone 284 ml
Final 71.1241 (mg) - Tare 70.8393 (mg) net 284.8 mg
- Blank ((.009 mg/ml)(284 ml) = 2.556 mg) = 282.24 mg

VI. Other particulate catches. = ______ mg

VII. Total particulate = I+II+III+IV+V+VI = ~~1322.55~~ mg
1321.7

Blanks

Acetone Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Methylene chloride Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Water Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Other Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
13[illegible]	15[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	60+	60+	60+	60+
	55	55	60	60+
	60+	60+	60	60
	60	55	55	—
	55	60	60	35
	50	50	—	50
	50	50	50	50
	45	45	35	40
	40	40	45	40
	45	40	45	45
	50	55	55	50
	50	50	55	50
	55	55	60	60
	60+	60+	60	60+
*	60+	60	60+	60+
20 1324	50	55	55	60
	60	50	50	55
	50	60	55	50
	55	50	60	50
	50	50	50	45
	45	45	45	45
	45	45	40	45
	45	40	45	45
	55	50	50	—
	45	40	40	40
	40	40	35	40
	55	60+	60	60
	60	60	60	60
	1470	1460	1420	1285

	220	215	215	210
Time	0	1/4	1/2	3/4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	50	50	45
	40	35	30	30
	30	35	40	40
	35	35	35	35
	35	35	40	45
	45	45	35	40
	40	35	40	40
	40	35	35	40
	40	40	35	35
	40	40	35	40
	40	40	40	40
2000	45	40	35	40
	45	45	40	40
	40	40	40	40
	40	45	40	40
	45	45	40	40
	40	45	40	45
	45	45	45	45
	45	40	45	40
	40	45	45	45
	40	45	40	45
	45	40	45	40
	45	45	45	45
	40	40	40	40
	45	45	45	45
	45	45	40	40
	40	40	35	40
	40	45	40	45
	40	40	40	40
	~~220~~	~~215~~	~~215~~	~~210~~

Ph 1

Stove Name ______

Date [illegible]

Clock Times (24 H) 1300

Run # 4, 2

Phase # ______

Observer Eileen Key

Distance to Source 25 feet

Direction to Source SE

Wind Direction SW-variable

Wind Velocity 0-25 mph

Cloud Cover 30 %

Plume Background trees

Stability moderately variable

Relative Humidity ______

Type Contaminant wood smoke

Color white

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

____ Units No. ______

Minutes of Observation ______

plume occasionally fumigating

110 delay due to approaching tornado

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
1410	35	35	40	40
	40	40	40	40
	40	40	40	40
	40	40	40	40
	40	40	40	40
	40	40	40	40
	40	40	40	45
	45	40	40	45
	45	45	45	40
	40	40	40	40
	40	40	40	40
	40	40	40	40
	40	40	40	40
	40	45	40	45
	40	40	45	45
	40	40	40	40
	40	40	40	40
	40	40	40	40
	40	40	40	40
	40	40	40	40
	45	45	45	45
	45	45	45	45
	45	45	45	45
	45	45	45	45
	45	45	45	45
	45	45	45	45
	45	40	40	45
	45	40	40	45
	45	45	45	45
	45	45	45	45

Time	0	1/4	1/2	3/4
[illegible]	45	45	45	45
	45	45	45	45
	45	45	45	45
	45	60+	60+	60+
	60+	60+	60+	60+
	60+	60+	60+	60+
155°	60+	60+	60+	60+
	60+	60+	60+	60+
	60+	60+	60+	60+
	60+	60+	60+	60+
[illegible]	60+	60	60	60
	60	60	60+	60+
	60+	60+	60+	60+
	60+	60+	60+	60+
	60+	60+	60+	60+
	60+	60+	60+	60+
	60+	60+	60+	60
	60+	60+	60+	60
	60	60	60	60
	60	60	60	60
	60	60+	—	60
	60	60	60	60
	60+	60	60+	60
	60+	60+	60+	60
	60	60	60	60
	60+	60+	60+	60
	60	60	60	60
	60+	60+	60+	60+
	60*	60*	60	60
	60	60	60*	60*

Stove Name __________

Date [illegible]

Clock Times (24 H) 1410

Run # # 2

Phase # __________

Observer [illegible]

Distance to Source 25'

Direction to Source SE

Wind Direction variable

Wind Velocity 0-5

Cloud Cover 5%

Plume Background gray, trees

Stability moderate

Relative Humidity __________

Type Contaminant wood smoke

Color white

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

____ Units No. __________

Minutes of Observation __________

draft fluctuates • affects opacity

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	55	-	50
	50	55	55	55
	50	50	50	50
	55	55	50	55
	50	55	55	55
	55	55	55	55
	55	55	55	55
	55	55	55	55
	55	55	55	55
	55	55	50	55
	55	55	55	55
	50	50	45	50
	45	45	45	45
	45	45	50	45
	45	45	45	45
	50	50	45	40
140°	40	40	40	40
	40	40	40	40
	40	40	40	40
	40	40	40	40
	40	40	40	40
	35	35	40	40
	40	40	40	40
	40	40	40	40
	40	40	40	40
	40	40	40	40
	40	40	40	40
	40	40	40	40

Time	0	1/4	1/2	3/4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	40	40	30	30
	30	30	30	30
150°	30	30	30	30
	30	30	30	30
	30	30	30	30
	25	25	25	25
	30	30	25	25
	25	25	25	20
	20	20	20	20
	20	25	20	20
	10	10	5	20
	25	20	25	25
	25	20	25	25
	30	30	35	35
	35	35	35	30
	35	35	35	35
	35	35	35	30
	35	30	35	35
	35	30	30	35
	35	30	35	35
	35	30	30	30
145°	30	30	30	25
	30	30	30	30
	25	25	25	20
	20	20	20	20
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15

Stove Name
Date [illegible]
Clock Times (24 H) [illegible]
Run # 6 2
Phase #
Observer [illegible]
Distance to Source 25'
Direction to Source SE
Wind Direction variable
Wind Velocity 0-5
Cloud Cover 0%
Plume Background roof trees
Stability moderate
Relative Humidity
Type Contaminant wood smoke
Color white

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

Units No.

Minutes of Observation

1112<

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
1615	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
135°	15	15	15	15
	15	15	15	15
	15	10	10	10
	10	10	10	10
140°	10	10	10	10
	10	10	10	10
	10	10	10	10
	10	10	5	5
	5	5	5	5
	5	5	5	5
	5	5	5	5
	5	5	5	5
	5	5	5	5
	5	5	5	5
	5	5	5	5
	5	5	5	5
	5	5	5	5
	5	5	5	5
	5	5	5	5
	5	5	5	5
	5	5	5	5
	5	5	5	0
134°	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0

Time	0	1/4	1/2	3/4
1645	0			0
	0	0	0	0
	0	0	0	0
	0	0	0	5
	~~10~~ 5	5	5	5
	5	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
140°	0	0	0	0
	0	0	0	0
~~1700~~	0	0	0	0
1700	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0

Stove Name ______

Date [illegible]

Clock Times (24 H) [illegible]

Run # ~~7~~ 2

Phase # ______

Observer Eileen Frey

Distance to Source 25'

Direction to Source SE

Wind Direction variable

Wind Velocity 0-5

Cloud Cover 0%

Plume Background roof trees

Stability moderate

Relative Humidity ______

Type Contaminant wood smoke

Color ~~dingy~~ white ~~[illegible]~~

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

____ Units No. ______

Minutes of Observation ______

1113<

Bacharach Smoke Spot

Run #2 Date 7/22 Operator RET

Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value	Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value
1	1537	Sample	335	9					
2	1541	Outlet	200	9					
3	1410	Sample	257	9					
4	1412	outlet	150	8					
5	1441	Sample	278	8					
6	1442	outlet	155	8					
7	1512	Sample	266	8					
8	1514	outlet	150	7					
9	1545	sample	257	8					
10	1547	outlet	150	7					
11	1614	sample	248	4					
12	1615	outlet	140	2					
13	1706	sample	278	2					

Comments:

1114<

ORSAT DATA

Stove Name ______________ Date 7/22/81

Run # 2 Phase # 1 a 2 Operator J.C

Sample Time 1311

	CO_2	O_2	CO	N_2
Accumulative	6.2	18.8	20.2	__
Net	6.2	12.6	1.4	79.8

Phase II ↓

Sample Time 1400

	CO_2	O_2	CO	N_2
Accumulate	6.2	20.0	20.5	__
Net	6.2	13.8	0.5	79.5

Sample Time 1430

	CO_2	O_2	CO	N_2
Accumulate	6.2	20.2	20.5	__
Net	6.2	14.0	0.3	~~20~~79.5

Sample Time 1445

	CO_2	O_2	CO	N_2
Accumulate	5.2	~~[illegible]~~ 19.9	20.6	__
Net	5.2	14.7	0.7	79.4

Sample Time 1520

	CO_2	O_2	CO	N_2
Accumulate	6.2	19.6	20.0	__
Net	6.2	~~12.4~~ 13.4	0.4	80

1115<

ORSAT DATA

Stove Name ______ Date 7/22/71

Run # 2 Phase # 2 Operator J.C

Sample Time 1555

	CO_2	O_2	CO	N_2
Accumulative	6.6	19.4	20.3	___
	[illegible]	19.2	19.4	
Net	6.6	13.2	0.9	79.3

Sample Time 1643

	CO_2	O_2	CO	N_2
Accumulate	5.6	19.4	20.0	___
Net	5.6	13.8	0.6	80

Sample Time 1700

	CO_2	O_2	CO	N_2
Accumulate	5.0	19.4	19.6	___
Net	5.0	14.4	0.2	79.4

Sample Time ______

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Sample Time ______

	CO_2	O_2	CO	N_2
Accumulate				
Net				

1116<

Moisture Data

Stove Name ______________________ Date 7/22/81

Run # 2 Phase # 1 Operator JC

Time (24 H)		Temperature		Moisture Percent
		Wet Bulb	Dry Bulb	
1307 ~~1507~~	1	150	360	20
1330 ~~1530~~		140	290	16
1350 ~~1550~~	4	144	360	15
1425 ~~1625~~	75	140	280	16
1445		130	272	17
1530	153	120	250	8
1630	203	114	260	5%
1650	224	110	255	4

1117<

Wood Moisture

Date 7/22/81 Test Run # 2
Operator J. C.

Meter Measurement

~~Corrected~~

FUEL	#	A	B	C	D	E	F	G	H	AVE		
1	4	13.5	16	16	13.5	12.5	15.0	15.0	14.5	14		12
2	28	11	13.5	12.5	11.0	13.0	16.0	13.5	11.5	13 ~~12.75~~		15
3	29	12	15	15.5	14	14	16.0	15.5	13.5 ~~14~~	14.~~43~~		12
4	30	13.5	15.5	14.5	12.0	13.0	14.5	13.5	11.5	14 ~~13.5~~		16
5	31	12.0	16.0	16.0	13.0	13.0	14.5	16.0	12.5	14		15
6	32	12.5	14.0	[illegible]	12.0	13.0	14.5	15.5	13.0	14		11
7.	33	12.5	15.5 ~~16.0~~	15.5	13.0	13.0	12.5	18.5	17.5	15		18
8	34	12	14.5	15.0	12.0	13.5	16.0	15.5	13.5	14		16½
9	35	17.5	16.5	19.0	17.0	12.5	15.5	17.0	12.0	15		17"
10	36	13.0	14.5	14.0	12.0	12.0	13.0	12.5	11.5	15		15½
11										14.2		
12												
Kindling												

Total Mass ~~28.0~~ 28.0

Percent Moisture 14.2

Total Mass (Dry Basis) ______

1118<

page 1 of

Operating Parameters

Run # 3 Date 7/23/81 Clock Time (24 H) 12:34 Operator [illegible]

Stove Name

Fuel: Initial Charge (lb) 34.5 Remaining Coal Bed (lb) 2.8

37.2 Test Charge 9 pieces 31.8 lb; Kindling Several pieces 2.7 lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	Opacity Meter	Catalyst Pre	Catalyst Post	CO %	CO$_2$ %	HC ppm		
12:34 0	37.2	Note: Tare weight was 2.7 lbs										
12:43												Dampers to 1/2 turn Open
10	32.8		694	480				.9	5.2	165	10%	
15	31.7		588	470				.9	3.0	250	10%	12.44 DAMPER to FULL Turn Open
20	30.8		691	430				.6	3.5	75	15%	CLOSE DAMPER to 3/4 @ 12.52
25	29.4		639	400				.95	4.5	100	15%	
30	28.9		622	370				.90	3.8	100	15%	
35	27.2		606	340				.90	4.0	110	15%	
40	26.4		600	340				.85	4.0	100	15%	
45	25.5		568	310				.70	3.0	80	15%	13.17 DAMPER OPEN to 1 turn
50	24.6		542	300				.75	3.0	98	15%	~~[illegible]~~
55	24.0		538	285				.75	3.0	105	15%	
60	23.2		531	280				.80	3.0	115	15%	

1.1 [illegible] 9.0 9.0 0.9 1

Comment Number:

18.2 lb → Ph II

4.6 lb → termination of Ph II

1120

page 2 of ___

Operating Parameters

Run # 3 Date 7/23/81 Clock Time (24 H) ________ Operator [illegible]

Stove Name ________

Fuel: Initial Charge (lb) ________ Remaining Coal Bed (lb) ________

Test Charge ________ pieces ________ lb; Kindling ________ pieces ________ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	Opacity Meter	Catalyst		CO %	CO_2 %	HC ppm		
						Pre	Post					
65	22.0		664	300				.75	5.0	170	15%	13:35 – DAMPER to FULL OPEN
70	20.5		581	350				.70	3.0	140	15%	DAMPER to 1 1/2 @ 13:38 " " 1 3/4 @ 13:43
75	19.5		567	350				.70	3.0	120	15%	
80	18.7		590	340				.72	3.0	120		DAMPER TO 2 turns open @ 1354
87	17.7		490	320				.65	2.5	105	20%	
95	16.4		998	300				.40	3.4	110	?	14:07 – Open Door to poke fire
100	15.6		702	300				.65	3.0	185	15%	1 TURN OPEN @ 14:10
105	14.7		931	300				.35	3.6	95	15%	
110	13.4		953	320				.45	4.0	100	15%	CLOSE DAMPER TO 1 TURN OPEN
115	12.5		738	350				.60	3.6	160	15%	
120	11.5		693	370				.50	4.5	125	15%	
125	10.3		713	400				.45	4.5	100	15%	14:40 DAMPER to 3/4 Turn open
130	9.8		766	430				.45	4.0	100	15%	

14:25

14:12 1 1/2 turns open

Comment Number: DAMPER CONROL

page 3 of ___

Operating Parameters

Run # 3 Date 7/23/81 Clock Time (24 H) ______ Operator SS[illegible]

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	Opacity Meter	Catalyst Pre	Catalyst Post	CO %	CO_2 %	HC ppm		
135	8.7		700	425				.45	4.2	110	15%	
140	8.4		652	430				.50	3.6	120	15%	
145	7.8		736	410				.38	4.0	85	15%	
150	7.3		650	400				.50	4.0	125	18%	
155	6.9		610	400				.50	3.4	120	18%	
160	6.6		545	385				.50	3.4	155	18%	
165	6.1		570	360				.60	3.4	160	20%	
170	5.8		558	350				.70	3.2	210	22%	
175	5.6		526	335				.70	3.2	200	15%	[illegible] DAMPER TO WIDEOPEN 15:24
180	5.0		579	350				.50	3.4	120	15%	
185	4.8		702	350				.45	3.4	105	15%	
186												End of Run

[illegible] 2.7 6278 4195 5.78 3.[illegible] 130 1.[illegible]

Comment Number:

Copy
122

pa. 1 2

4.8

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ 1.84 Date 7/23/81 Train Operators DLP
Run # 3 Phase # 1 Clock Time (24 H) 1234 - 1355
Sample Box # 1 Stack Dimensions 8" Ø
Probe Length 6' Barometric Pressure 29.89" Hg
Probe Material GLASS Nozzle Diameter 0.625" Ø

Leak check < .02 CFM @ 20" Hg Vac

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments		
			Calc.	Act.		T in	T out			Imp.	WB	DB	%M	#7	#8
0	180.536	.005	.28	.28	330	87	85	0	307	74				317	842
3		.009	.48	.48		86	86	0	307	74					
5	182.31	.009	.48	.48	620	85	87	0	307	73			>30	467	
7		.011	.50	.50	694	86	87	1	300	71					
10	184.21	.005	.20	.20		87	86	0	298	70					
14	185.	.003	.18	.18	346	87	86	0	301	68				279	588
16		.004	.24	.24	323	87	86	0	290	68					
19	186.82	.005	.30	.30	340	87	86	0	295	67				306	
23	188.12	.003	.25	.25	320	87	86		297	66			14	270	
26	189.08	.005	.38	.38	307	88	87	.5	297	66				268	
30	190.33	.005	.45	.45	300	88	88	1	298	66				261	
35	192.30	.004	.43	.43	288	88	88	0	300	66				256	
40	194.18	.003	.28	.28	284	88	88	0	302	67			20?	243	578
46	196.21	.003	.28	.28	277	88	88	0	300	67					
53	198.38	.004	.32	.32	265	88	88	.5	295	68				230	

1.0 5.05 1664

pa__ 2 .. 2

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ ______ Date 7/23/81 Train Operators Dup

Run # 3 Phase # 1 Clock Time (24 H) ______

Sample Box # ______ Stack Dimensions ______

Probe Length ______ Barometric Pressure ______

Probe Material ______ Nozzle Diameter ______

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments		
			Calc.	Act.		T in	T out			Imp.	WB	DB	%m	#7	#8
60	200.74	.004	.32	.32	259	88	88	1	295	69				233	527
65	202.25	.004	.27	.27	438	88	88	5	300				20		
74	204.37	.003	.25	.25	329	88	88	10	301	74				270	567
80	206.01	.003	.25	.25	304	88	88	14	301	75				255	
82	206.442			1.09	1370	35.1									
		0.00360													

4124

1.5 120/15 .15 /25 .15 170

Oregon Method 7 Sampling Data Sheet

pa 1 .. 1

Stove Name ______ H@ 1.84 Date 7/23/80 Train Operators DCP
Run # 3 Phase # 2 Clock Time (24 H) 1359-1540
Sample Box # Napp#2 Stack Dimensions 8"Ø
Probe Length 3' Barometric Pressure 29.90
Probe Material Glass Nozzle Diameter .502"Ø

leak check < .02 CFM @ 12" Hg vac

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments		
			Calc.	Act.		T in	T out			Imp.	WB	DB	2M	#7	#8
82	206.442	.002	.08	.08	223	89	89	0	287	79				212	492
87	207.89	.001	.06	.06	302	89	89		201	79				242	
95	208.71	.001	.06	.06	331	88	90	0	305	79			11	241	
100	209.16	.001	.04	.06	369	88	90		304	78					
110	210.12	.001	.04	.05	406	88	89	0	301	78			10	332	
123	211.18	.004	.14	.14	421	89	89	0	305	72				339	779
136	213.78	.005	.15	.15	324	90	91	0	306	71			11	271	
145	215.47	.005	.20	.20	317	90	91		303	70				273	
160	219.31	.004	.16	.16	267	91	91	0	305	69			6	226	
170	221.27	.004	.19	.19	251									246	
183	224.462			.15	3217	1611									

OMNI Environmental Services
1380 NW Lancashire Ct.
Beaverton, OR 97006
(503) 645-9685

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SOURCE SAMPLING-LABORATORY ANALYSIS OF PARTICULATE SAMPLE

Test Run 3, PH 1 Project # P5048
Date of Test 7/23/81

CONDENSED WATER DETERMINATION

Impinger:	#1	#2	#3	#4	Total Condensate
Final weight	596.6	541.3	428.4	773.4	
Initial weight	541.3	536.4	427.9	769.2	
Net weight	55.3	4.9	0.5	4.2	64.9

60.7

FILTER IDENTIFICATIONS

Front Filter-First Filter # 066
Back Filter-First Filter# 204
Front Filter-Second Filter #
Back Filter-Second Filter#

OTHER INFORMATION, COMMENTS

#2 100ml
#1 160ml

ORSAT DATA

	CO_2	O_2	CO	N_2
Analysis 1				
Analysis 2				
Analysis 3				
Average				

Time
Test conditions:

CO_2	O_2	CO	N_2
Atomic Wt. (44)	Atomic Wt. (32)	Atomic Wt. (28)	Atomic Wt. (28)

M_d=

+ + + = Total Atomic Wt.

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SOURCE SAMPLING-LABORATORY ANALYSIS OF PARTICULATE SAMPLE

Test Run 3 PH. 2 Project # 15048

Date of Test 7/23/81

CONDENSED WATER DETERMINATION

Impinger:	#1	#2	#3	#4	Total Condensate
Final weight	550.3	530.7	429.3	740.7	
Initial weight	528.2	529.5	429.0	736.5	27.8
Net weight	22.1	1.2	0.3	4.2	

23.60

FILTER IDENTIFICATIONS

Front Filter-First Filter #067 Back Filter-First Filter#203

Front Filter-Second Filter # Back Filter-Second Filter#

OTHER INFORMATION, COMMENTS

#1-120ml
#2-100ml

ORSAT DATA

	CO_2	O_2	CO	N_2
Analysis 1				
Analysis 2				
Analysis 3				
Average				

Time

Test conditions:

CO_2	O_2	CO	N_2
Atomic Wt. (44)	Atomic Wt. (32)	Atomic Wt. (28)	Atomic Wt. (28)

M_d=

= Total Atomic Wt.

Enivironmental Services, Inc.
10260 SW Nimbus Ave., M-8
Portland, Ore. 97223
(503) 620-7337

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LABORATORY TOTAL PARTICULATE CALCULATIONS

Client________ Source Description Stove
Plant________ Date(s) Analysis________
Sampling Date(s) 7/23/81 Run # 3 PH 1 Project # PS048

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 225 (ml) of Aceton
Final 74.9163 (mg) - Tare 74.5466 (mg) net 369.7 mg
- Blank ((.009 mg/ml)(225 ml) = 2.025 mg) = 367.67 mg

II. Filter catch(es). F#066 B#208
Front filter Final 0.5510 (mg) - Tare 0.4737 (mg) net 0.0773
+ Back-up filter Final 0.3890 (mg) - Tare 0.1517 (mg) = 0.2373 mg
Total 0.3146

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2CL2 85 ml
Final 74.7656 (mg) - Tare 74.5809 (mg) net 184.7 mg
- Blank((.0025 mg/ml)(85 ml) = .2125 mg) = 184.49 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.
Final 70.9525 (mg) - Tare 70.8456 (mg) net. 106.9 mg 105.9~~6~~4 ~~105.76~~
- Blank ((.006 ~~.0025~~ mg/ml)(221 ml total ~~0.9566~~
- ~~29.79~~ ml condensed = ~~191.11~~ ml) = ~~0.477~~ mg) = ~~106.42~~ mg
~~29.59~~ ~~1.9~~ 60.7 ~~191.11~~ ~~156.1~~ 160.3 ~~1.149~~ 9.6

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Acetone 214 ml
Final 72.7514 (mg) - Tare 72.6264 (mg) net 125.0 mg
- Blank ((.009 mg/ml)(214 ml) = 1.926 mg) = 123.07 mg

VI. Other particulate catches. = — mg

VII. Total particulate = I+II+III+IV+V+VI = 1095.58 mg
.77

Blanks
Acetone Final______ (mg) - Tare______ (mg)
= ______ mg/______ ml = ______ mg/ml

Methylene chloride Final______ (mg) - Tare______ (mg)
= ______ mg/______ ml = ______ mg/ml

Water Final______ (mg) - Tare______ (mg)
= ______ mg/______ ml = ______ mg/ml

Other Final______ (mg) - Tare______ (mg)
= ______ mg/______ ml = ______ mg/ml

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LABORATORY TOTAL PARTICULATE CALCULATIONS

Client ______ Source Description Stove
Plant ______ Date(s) Analysis ______
Sampling Date(s) 7/23/81 Run # 3 PH2 Project # 85048

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 85 (ml) of Acetone
Final 70.7417 (mg) - Tare 70.6463 (mg) net 95.4 mg
- Blank ((.009 mg/ml)(85 ml) = 0.765 mg) = 94.64 mg

II. Filter catch(es). F# 67 B# 203
Front filter Final 0.5043 (mg) - Tare 0.4671 (mg) 0.0372
+ Back-up filter Final 0.3608 (mg) - Tare 0.1508 (mg) = 0.2091 mg
total 0.2463

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2CL2 85 ml
Final 72.7212 (mg) - Tare 72.6096 (mg) net 111.6 mg
- Blank ((.0025 mg/ml)(85 ml) = 0.2125 mg) = 111.39 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.
Final 73.0536 (mg) - Tare 72.9787 (mg) net 74.9 mg
- Blank ((.006 mg/ml)(220 ml total
- ~~27.8~~ 23.6 ml condensed = ~~192.2~~ 196.4 ml) = ~~1.153~~ 1.18 mg) = 73.7~~8~~2 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Acetone 226 ml
Final 73.6873 (mg) - Tare 73.5414 (mg) net 145.9 mg
- Blank ((.009 mg/ml)(226 ml) = 2.034 mg) = 143.87 mg

VI. Other particulate catches. = — mg

VII. Total particulate = I+II+III+IV+V+VI = 669.9~~8~~2 mg

Blanks

Acetone Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Methylene chloride Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Water Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Other Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

1128<

Bacharach Smoke Spot

Run 3 Date 7/ Operator JC

Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value	Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value
20	1320	S	276	6					
21	1324	O	180	6					
22	1345	S	369	8					
23	1347	O	265	7					
24	1416	S	370	8					
25	1410	O	250	7					
26	1443	S	400	6					
27	1444	O	235	6					
28	1510	S	272	7					
29	1515	O	185	6					

Comments:

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
[illegible]	50	45	45	[illegible]
	40	30	[illegible]	[illegible]
	20	20	20	20
	20	20	25	20
	20	20	20	20
°	20	10	10	15
-1'')	10	15	20	20
	10	10	15	30
	30	25	25	30
	35	35	35	35
	30	30	30	35
	30	45	60+	60+
	60+	60	60	60
	60	60+	60	60
	60	60	55	55
	35	40	30	35
	30	25	25	25
	20	20	20	20
	25	20	25	25
	25	25	25	25
	25	25	20	20
	20	20	20	20
	20	20	20	20
	20	20	25	20
	20	20	20	20
255°	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	15	15

Time	0	1/4	1/2	3/4
[illegible]	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
210°	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
140°	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
140°	15	15	15	15

Stove Name ____________

Date 7 23 81

Clock Times (24 H) 1230

Run # 3

Phase # ____________

Observer Eileen Key

Distance to Source 30'

Direction to Source SE

Wind Direction variable

Wind Velocity 0-5

Cloud Cover 60%

Plume Background roof, trees

Stability moderate

Relative Humidity ____________

Type Contaminant woodsmoke

Color white

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

____ Units No. ____________

Minutes of Observation ____________

1130<

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
[illegible]	[illegible]	[illegible]		[illegible]
	[illegible]	[illegible]	25	[illegible]
	20	[illegible]	[illegible]	20
	25	25	25	25
	25	25	25	25
	25	25	25	[illegible]
	25	20	20	25
	25	25	25	25
	25	20	20	25
	25	20	25	25
	25	25	25	25
	25	35	20	20
	20	20	20	20
	25	25	20	25
	25	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	25	20	20	20
	30	20	20	20
	20	25	25	25
	30	30	30	30
	30	30	30	30
	30	30	25	25
	25	25	25	25
	25	25	20	15
	30	30	30	20
	30	15	25	40
[illegible]80°	35	40	40	40
	40	40	40	40

Time	0	1/4	1/2	3/4
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	30	[illegible]	[illegible]	[illegible]
	20	25	25	25
	25	25	25	25
	20	25	20	20
	25	20	20	20
	20	15	20	20
	15	15	15	15
	15	15	15	15
	15	15	15	20
	20	20	20	20
	20	20	20	20
	20	20	25	20
280°	20	20	20	20
	25	25	25	25
	25	25	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
[illegible]	15	15	15	15

Stove Name ______
Date ______
Clock Times (24 H) [illegible]
Run # [illegible]
Phase # 2
Observer [illegible]
Distance to Source 50'
Direction to Source SE
Wind Direction variable
Wind Velocity 0-5
Cloud Cover [illegible]
Plume Background [illegible]
Stability moderate
Relative Humidity ______
Typ: Contaminant [illegible]
Color [illegible]

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

____ Units No. ______

Minutes of Observation ______

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
230°	20	20	15	15
225°	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
220°	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	15	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20

Time	0	1/4	1/2	3/4
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	25	25
115°	25	25	25	25
	20	25	25	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
200°	20	20	20	20

Stove Name ____________

Date ____________

Clock Times (24 H) ____________

Run # ____________

Phase # [illegible]

Observer [illegible]

Distance to Source 30'

Direction to Source SE

Wind Direction variable

Wind Velocity 0-5

Cloud Cover 40%

Plume Background [illegible]

Stability moderate

Relative Humidity ____________

Type Contaminant condensate

Color white

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

____ Units No. ____________

Minutes of Observation ____________

ORSAT DATA

Stove Name ____________________ Date 7/23/81

Run # 3 Phase # 1 Operator JC

Sample Time 1244

	CO_2	O_2	CO	N_2	~~Total~~
Accumulative	11.8	18.8	19.6		
Net	11.8	7.0	~~0.8~~ 0.6	~~[illegible]~~ 80.4	~~19.6~~

Sample Time 1300

	CO_2	O_2	CO	N_2	
Accumulate	5.2	19.8	20.4	___	
Net	5.2	14.6	0.6	79.6	~~20.4~~

O2=13-20

Sample Time 1315

	CO_2	O_2	CO	N_2	
Accumulate	4.0	14.4	20.0	___	
Net	4.0	15.0	0.6	84	~~16.0~~

Sample Time 1353

	CO_2	O_2	CO	N_2	
Accumulate	3.6	19.8	20.3	___	
Net	3.6	16.2	~~[illegible]~~ 0.5	79.7	~~20.3~~

Phase II Sample Time 1431

	CO_2	O_2	CO	N_2	
Accumulate	6.2	20.0	20.2	___	
Net	6.2	13.8	0.2	79.8	~~20.2~~

ORSAT DATA

Stove Name ____________ Date 7/23/81

Run # 3 Phase # 2 Operator JC

Sample Time 1455

	CO_2	O_2	CO	N_2	~~Total~~
Accumulative	5.0	20.0	20.4		
Net	5.0	15.0	0.4 ~~0.2~~	79.6	~~20.4~~

Sample Time 1530

	CO_2	O_2	CO	N_2	
Accumulate	3.9	20.0	20.4		
Net	3.9	16.1	0.4	79.6	~~20.4~~

O_2 = 14.97

Sample Time ____________

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Sample Time ____________

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Sample Time ____________

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Moisture Data

Stove Name ____________________ Date 7/23/71

Run # 3 Phase # 1 & 2 Operator JC

Time (24 H)	Temperature Wet Bulb	 Dry Bulb	Moisture Percent
1240	175	700	~35
1257	140	360	14
1315	150	320	20
~~1320~~	~~150~~	~~330~~	—
1342	150	330	20
1409 ~~[illegible]~~	152	310	11
1430	138	445	10
1450	138	410	11
~~1522~~	~~110~~	~~215~~	~~3~~
1526	124	336	6

Wood Moisture

Date 7/23/81 Test Run # 3

Operator JC

Meter Measurement

1. not used → 7/23 Run 3

FUEL		A	B	C	D	E	F	G	H	AVE		Dia. (inches)
~~1~~	~~40~~	~~23~~	~~22~~	~~22~~	~~22~~	~~49~~	~~52~~	~~75~~	~~70~~	~~39~~	~~41~~	~~13~~
2	41	22	24	21	21	45	54	52	55	37	39	12
3	42	22	22	23	22	47	44	45	40	33	35	14
4	43	22.	22	23	21	55	55	54	52	38	40	10
5	44	27	22	28	27	45	45	44	46	36	38	9
6	45	22	23	23	22	50	44	47	50	35	37	10
7.	46	22	23	23	24	52	47	49	44	36	38	10
8	47	22	23	23	22	45	48	54	55	37	39	13
9	48	21	22	22	22	43	44	45	45	33	35	14⅓
10												
11												
12												
Kindling												

Total Mass 31.8 lbs

Percent Moisture ~~38~~ 37.6%

Total Mass (Dry Basis) 21.5 lbs

page 1 of 1

Operating Parameters

Run # 4 (cox C START) Date 8-5-81 Clock Time (24 H) ~~2~~ 9:59 Operator SEW

Stove Name

Fuel: Initial Charge (lb) 29.7 Remaining Coal Bed (lb)

Test Charge 8 pieces 26.3 lb; Kindling Several pieces 3.4 lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES					NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	~~Opacity Meter~~ O_2 meter	Catalyst Pre	Catalyst Post	CO %	CO_2 %	HC ppm		
0	29.7											
5	?		851°F	200				2.6	12	300	10%	
10	22.3		704	625	10%			3.6	8.0	250	10%	
18	20.7		605	625	13.5			1.2	5.0	325	45%	
23	19.8		575	625	13.5↑			1.2	5.0	400	40%	10:19 CLOSED DAMPER to [illegible]
28	19.0		637	625	13.0			1.2	7.0	300	30%	
30	18.6		643	600	15.0			.7	4.5	225	25%	
32	18.3		648	625	13.0			1.2	7.0	300	30%	
34	18.0		705	625	12.5			1.4	7.0	325	30%	
35	17.9		703	625	11.5			1.4	7.5	225	30%	END OF RUN #4 @ 35 min

Comment Number: Stack expansion → unable to read weigh until 10 min into Run

1138<

pa.. 1 .. 1

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ 1.84 Date 8/5/81 Train Operators DLP

Run # 4 Phase # NA Clock Time (24 H) 0959- 1034

Sample Box # Napp#1 Stack Dimensions 8" Ø

Probe Length 6' Barometric Pressure 29.91" Hg

Probe Material Glass Nozzle Diameter 0.625" Ø

leak check <.02CFM @18"Hg Vac.

$C_p = 0.803$

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			top #7	EM Comments chamber #8
			Calc.	Act.		T in	T out			Imp.	WB	DB		
0	285.868	.10		.40										20% assumed
2					574									
2.5 ~~[illegible]~~		.009	.45	.45	701	75	74	0	311	58			542	941
5	287.72	.009	.45	.45	772								654	
7	288.46	.009	.45	.45	816	76	75	0	299	61			670	(5.E.
9	289.22	.010	.50	.50	893								582	2. 60°)
11.5		.003	.18	.20	602	78	76	0	266	66			313	
14	291.06	.002	.12	.13	392								295	568
17	291.61	.003	.18	.20	335	79	78		-				272	
20	292.39	.003	.22	.25	314				285	61			270	
24	293.58	.003	.22	.25	292	81	80	0					245	
29	295.03	.003	.22	.25	291				302	58			254	15 652
35	296.770					81	80							

Environmental Services
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OMNI

SOURCE SAMPLING-LABORATORY ANALYSIS OF PARTICULATE SAMPLE

Run #4

Test ____________ Project # ____________
Date of Test ____________

CONDENSED WATER DETERMINATION

Impinger:	#1	#2	#3	#4	Total Condensate
Final weight	564.9	539.9	428.7	714.1 ~~[illegible]~~	
Initial weight	530.9	536.1	427.9	708.9	
Net weight	34.0	3.8	0.8	5.2	43.80

$\underbrace{34.0 \quad 3.8 \quad 0.8}_{38.6}$

FILTER IDENTIFICATIONS

Front Filter-First Filter # 056 Back Filter-First Filter# 206

Front Filter-Second Filter # ____ Back Filter-Second Filter# ____

OTHER INFORMATION, COMMENTS

Composite #1 + #10
2
bottles

#1 128 ml
#2 100 ml
#3 Not measurable

ORSAT DATA

	CO_2	O_2	CO	N_2
Analysis 1				
Analysis 2				
Analysis 3				
Average				

Time ____________

Test conditions: ____________

CO_2	O_2	CO	N_2
Atomic Wt. (44)	Atomic Wt. (32)	Atomic Wt. (28)	Atomic Wt. (28)

M_d = ____________

= Total Atomic Wt.

139<

Enivironmental Services, Inc.
10260 SW Nimbus Ave., M-8
Portland, Ore 97223
(503) 620-7337

OMNI

LABORATORY TOTAL PARTICULATE CALCULATIONS

Client DEL-GREEN Source Description ______
Plant ______ Date(s) Analysis [illegible] - 8-10
Sampling Date(s) 8-5-81 Run # 4 Project # 85048

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 282 (ml) of Acetone
Final 72.8174 (mg) - Tare 72.6599 (mg) net 157.5 mg
- Blank ((0.045 mg/ml)(282 ml) = 12.69 mg) = 144.81 mg

II. Filter catch(es). F#056 B# 206
Front filter Final 0.5762 (mg) - Tare 0.4621 (mg) 0.1141
+ Back-up filter Final 0.4186 (mg) - Tare 0.1539 (mg) = 0.2647 mg
Total 0.3788

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2CL2 75 ml
Final 68.2824 (mg) - Tare 68.1508 (mg) net 131.6 mg
- Blank ((0.0213 mg/ml)(75 ml) = 1.597 mg) = 130.00 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.

Final 72.0280 (mg) - Tare 71.8454 (mg) net 182.6 mg
- Blank ((0.0079 mg/ml)(229 ml total
- ~~4370~~ 38.6 ml condensed = ~~1842~~ 189.4 ml) = 1.955 1.5 mg) = ~~131.0~~ 181.1 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Acetone 340 ml
Final 72.6518 (mg) - Tare 72.3877 (mg) net 264.1 mg
- Blank ((0.0450 mg/ml)(340 ml) = ______ mg) = 248.8 mg

VI. Other particulate catches. = ______ mg

VII. Total particulate = I+II+III+IV+V+VI = ~~4488.6~~ mg
~~7493~~
10835

Blanks

Acetone Final 70.3637 (mg) - Tare 70.3628 (mg) net 0.9 mg
= ______ mg/ 20 ml = 0.0450 mg/ml

Methylene chloride Final 73.6565 (mg) - Tare 63.6549 (mg) net 1.6 mg
= ______ mg/ 75 ml = 0.0213 mg/ml

Water Final 69.7802 (mg) - Tare 69.7791 (mg) net 1.1 mg (some fiber & dust in bottle may contain some dust during testing)
= 1.1 mg/ 140 ml = ~~140~~ .0079 mg/ml

Blank filter Other Final 0.4665 (mg) - Tare 0.4664 (mg) 0.0001 mg
= ______ mg/ ______ ml = ______ mg/ml

0.1 mg

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
1013	30	35	35	40
1014	40	50	50	50
1015	30	35	40	40
1016	35	40	45	50
1017	50	30	35	30
	185	190	205	210

Time	0	1/4	1/2	3/4

Stove Name ______

Date 8/5/81

Clock Times (24 H) 0 1013

Run # 4

Phase # cold start

Observer PET

Distance to Source 50ft

Direction to Source NW

Wind Direction ~ NE

Wind Velocity 0-2

Cloud Cover 10%

Plume Background trees

Stability ______

Relative Humidity ______

Type Contaminant ______

Color white

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

____ Units No. ______

Minutes of Observation ______

Bacharach Smoke Spot

Run #4 cold start Date 3/5/81 Operator

Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value	Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value
30	1018	Sample	292	-					
31	1021	outlet	180	±					

Comments:

ORSAT DATA

Stove Name ______ Date 8/5/81

Run # 4 Phase # ______ Operator J.C

Sample Time ~~1004~~ 1012

	CO_2	O_2	CO	N_2
Accumulative	7.2	19.8	20.2	
Net	7.2	12.6	7.6	79.8

Sample Time 1033

	CO_2	O_2	CO	N_2
Accumulate	8.8	18.4	20.2	
Net	8.8	~~10~~9.6	1.8	79.8

Sample Time ______

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Sample Time ______

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Sample Time ______

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Moisture Data

Stove Name

Date 8/5/81

Run # 9

Phase # -

Operator [illegible]

Time (24 H)	Temperature Wet Bulb	Temperature Dry Bulb	Moisture Percent
1008	198	950	
1027	144	384	15

Wood Moisture

Date 8/5/81 Test Run # 4

Operator J.C

Meter Measurement

FUEL		A	B	C	D	E	F	G	H	AVE	
1	49	11	12	~~12~~11.5	11	12.5	12.5	13	12	11.9	
2	50	12	13.5	13.5	12	11	11	13.5	13.5	12.5	
3	51	12.5	14.5	13	11	13.5	14.5	13.5	12.5	13.1	
4	53	13	13	12.5	11	13	13	13	12.5	12.6	
5	55	12	14	13	12.5	13	15	15	14	13.6	
6	56	14	16	14.5	12.5	13	14	14	1.3	13.9	
7.	57	13	15.5	12	10	13	16	15.5	12.5	13.4	
8	58	14.5	15.5	14	13	15.5	18	16	13.5	15.0	
9	~~59~~	~~12~~						Uncorrected		Ave =	13.25
10	60										
11											
12											
Kindling											

Total Mass 29.5 lbs

Percent Moisture 14

Total Mass (Dry Basis) 25.4

°.1 Hpa
146
A

pa 1

Operating Parameters

Run # 5 (Hot start) Date 8-5-81 Clock Time (24 H) 12:42 Operator SS
Stove Name
Fuel: Initial Charge (lb) 28.6 Remaining Coal Bed (lb) 2.6
Test Charge 7 pieces 26 lb; Kindling pieces lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	~~Opacity Meter~~ O2 meter	Catalyst Pre	Catalyst Post	CO %	CO_2 %	HC ppm		
0	28.6									~~350~~	~~60%~~	DAMPER - 1 turn open
5	27.0		490	380	11.5			1.6	7.5	450	60%	
10	25.2		721	480	10(%)			2.6	12.5	500	18%	1/2 turn Close
15	24.1		732	550	12.5%			1.8	7.5	425	50%	
20	22.5		724	550	12.5			1.8	11.0	350	50%	
25	21.3		563	575	11.5			1.4	6.0	325	40%	open to 1/4 turn @ 23 min
30	20.8		545	550	14.5			1.7	6.0	325	45%	
35	20.0		544	490	14.0			1.5	7.0	350	50%	
40	19.3		537	480	13.5			1.4	7.0	325	45%	
45	18.4		568	475	14.0			1.4	7.0	400	50%	
50	17.8		572	480	14.5			1.2	6.0	375	50%	
55	17.3		576	480	14.0			1.5	7.0	400	55%	
60	16.6		581	500	15.0			1.1	6.0	300	55%	
			7153	5990	157.5			[illegible]	[illegible]	[illegible]	[illegible]	

Comment Number:

page 2 of ___

Operating Parameters

Run # 5 Date 8-5-81 Clock Time (24 H) ______ Operator SS

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	~~Opacity Meter~~ (%) O_2 Meter	Catalyst Pre	Catalyst Post	CO %	CO_2 %	HC ppm		
65	15.8		543	480	14.5			2.4	6.0	575	70%	
70	14.8		518	450	14.5			2.5	5.5	650	70%	open DAMPER to ½ open
75	13.9		570	500	13.0			1.0	7.0	200	45%	closed DAMPER to 1/4 open
80	13.4		532	540	14.5			1.8	6.0	350	50%	
85	13.0		560	500	15.0			1.2	6.5	275	50%	
90	12.2		563	480	14.0			1.5	6.0	350	55%	
95	11.8		544	450	15.0			1.2	5.5	400	60%	
100	11.3		536	430	14.5			2.1	6.0	450	55%	
105	10.8		545	420	14.0			2.1	5.5	425	50%	
110	10.2		548	420	14.0			2.1	6.0	350	50%	
115	9.8		560	410	14.0			2.0	5.5	325	45%	
120	9.5		575	410	15.25			1.7	6.0	275	45%	
125	9.0		575	420	14.5			1.5	4.5	200	40%	
	155.5		7169	5910	[illegible]			[illegible]	76	[illegible]		

Comment Number:

1147

1148 A

page 3 of ___

Operating Parameters

Run # 5 Date 8-5-81 Clock Time (24 H) ________ Operator ________

Stove Name ________

Fuel: Initial Charge (lb) ________ Remaining Coal Bed (lb) ________

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	~~Opacity Meter~~ % O2 Mtr	Catalyst Pre	Catalyst Post	CO %	CO2 %	HC ppm		
130	8.6		569	420	14.75			1.5	6.0	250	40%	
135	8.4		571	420	14.0			1.4	5.5	200	30%	
140	7.9		570	420	13.75			1.5	6.0	200	30%	
145	7.6		568	420	13.75			1.5	6.0	175	25%	
150	7.4		554	420	14.0			1.4	5.5	150	25%	
155	7.2		557	430	14.5			1.4	5.0	145	20%	
160	7.0		588	425	14.25			1.3	6.0	175	25%	
165	6.8		586	420	14.50			1.2	5.0	150	20%	
170	6.4		579	410	14.25			1.3	6.0	125	20%	
175	6.2		569	410	14.75			1.2	5.5	100	18%	
180	6.0		567	410	14.75			1.2	5.5	100	18%	
185	5.9		565	410	14.5			1.2	5.0	90	18%	
190	5.7		570	400	14.5			1.2	5.0	75	18%	
			7413	5835	186.25			17.3	72	1935		

Comment Number:

pa. 4 5

Operating Parameters

Run # 5 Date 8-5-81 Clock Time (24 H) ________ Operator [illegible]

Stove Name ________

Fuel: Initial Charge (lb) ________ Remaining Coal Bed (lb) ________

Test Charge ________ pieces ________ lb; Kindling ________ pieces ________ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	~~Opacity~~ ~~Meter~~ % O_2 Meter	Catalyst		CO %	CO_2 %	HC ppm		
						Pre	Post					
195	5.9		559	400	14.75			1.2	5.0	75	18%	
200	5.1		545	400	15.0			1.0	4.5	50	18%	
205	5.0		535	400	14.75			1.25	5.0	50	18%	
208	4.8		520	400	15.0			1.0	3.6	40	18%	END of Run 5
			159	1600	59.5			4.45	17.1	215	%	

Comment Number:

150<

page 1 of 2

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ 1.84 Date 8/5/81 Train Operators DLP
Run # 5 Phase # NA Clock Time (24 H) 1242- 1610
Sample Box # Napp #2 Stack Dimensions 8"Ø
Probe Length 3' Barometric Pressure ~~[illegible]~~ ← 29.89
Probe Material Glass Nozzle Diameter 0.502"Ø Cp = 0.824

leak check < .02CFM
@ 18"Hg vac

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments		
			Calc.	Act.		T in	T out			Imp.	WB	DB	#7	2m	#8
0	296.904	.005	.11	.15	302	90	90	0	301	70					
1.5		.004	.09	.10									248	amm 20%	473
2.5		.002	.05	.10	326	90	90	0	302	71					
4.5	297.74	.004	.13	.15	358								261		
6	298.04	.004	.13	.15	370								295		470
8.5	298.59	.004	.13	.15	464	90	90	0	302	73			367		
11.5	299.27	.004	.11	.15	470								315		
14	299.89	.004	.11	.15	410	91	91	0	303	74			283		760
17	300.36	.003	.08	.13	382								281		
23	301.46	.002	.05	.10	400	91	92	0	302	74			272		
30.5	302.45	.003	.09	.10	264								199		545
37	303.48	.002	.06	.08	266	93	95		302	76			199		
45	304.20	.002	.06	.08	273	93	96	0	302	77			205	14	
55	304.84	.002	.08	.08	278	94	97	5.5	299	80			215		586
66	306.96	.002	.08	.10	265	95	98	6.5	300	76			204	11	
				1.77	[illegible]										

pa 2 2 wu 4.0 lbs

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ ______ Date 8-5-81 Train Operators DLP

Run # 5(CMT) Phase # ______ Clock Time (24 H) ______

Sample Box # ______ Stack Dimensions ______

Probe Length ______ Barometric Pressure ______

Probe Material ______ Nozzle Diameter ______

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments		
			Calc.	Act.		T in	T out			Imp.	WB	DB	#7	gm	#8
76	308.87	.002	.08	.10	336	96	98	6.5	299	77			243	7	
87	310.82	.002	.09	.10	260	96	98	6.5	298	78			203		
100	313.12	.002	.09	.10	252	97	99	7	297	78			198		538
110	314.78	.002	.09	.10	249	97	99	7	300	77			197	8	
117	315.97	.002	.09	.10	267	97	100	7.5	299	78			204		
126	317.56	.002	.09	.10	263	97	100	7.5	300	78			202		567
136	319.37	.002	.09	.10	259	98	100	7.5	299	79			205		
146	321.08	.002	.09	.10	254	98	101	7.5	299	79			202		
155	322.67	.002	.09	.10	254	98	101	8	299	80			206		559
165	324.41	.002	.09	.10	239	99	102	8	299	77			197		
176	326.34	.002	.10	.10	238	99	102	8	298	78			195	5	
186	328.38	.002	.10	.11	231	99	101	7	298	76			187		
195	330.10	.002	.10	.11	226	99	101	7	297	77			187		
205	332.	.002	.10	.11	220	99	102	7	299	78			181		535
268	332.452				'										

1.43 5.78

OMNI Environmental Services
1380 NW Lancashire Ct.
Beaverton, OR 97006
(503) 645-9685

OMNI

#2
Run #5

SOURCE SAMPLING-LABORATORY ANALYSIS OF PARTICULATE SAMPLE

Test ______________ Project # ______________

Date of Test ______________

CONDENSED WATER DETERMINATION

Impinger:	#1	#2	#3	#4	Total Condensate
Final weight	580.2	540.1	430.7	751.2	
Initial weight	530.4	537.0	429.4	741.1	
Net weight	49.8	3.1	1.3	10.1	64.3

54.2

FILTER IDENTIFICATIONS

Front Filter-First Filter # 064 Back Filter-First Filter# 205

Front Filter-Second Filter # ______ Back Filter-Second Filter# ______

OTHER INFORMATION, COMMENTS

Coupon #6 → Bottom
" " #7 → Top → (TRANS.)

#1 – 150ml
#2 – 108ml
#3 –

ORSAT DATA

	CO_2	O_2	CO	N_2
Analysis 1				
Analysis 2				
Analysis 3				
Average				

Time ______________

Test conditions: ______________

CO_2	O_2	CO	N_2
Atomic Wt. (44)	Atomic Wt. (32)	Atomic Wt. (28)	Atomic Wt. (28)

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M_d= ______________

______ + ______ + ______ + ______ = Total Atomic Wt.

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Portland, Ore. 97223
(503) 620-7337

OMNI

LABORATORY TOTAL PARTICULATE CALCULATIONS

Client Del -Green Source Description ______
Plant ______ Date(s) Analysis ______
Sampling Date(s) 8-5-81 Run # 5 Project # P5048

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 281 (ml) of Acetone
Final 74.7304 (mg) - Tare 74.1235 (mg) net 606.9 mg
- Blank ((0.045 mg/ml)(281 ml) = 12.64 mg) = 594.3 mg

II. Filter catch(es). F#064 B# 205
Front filter Final 0.6978 (mg) - Tare 0.4670 (mg) 0.2308
+ Back-up filter Final 0.5653 (mg) - Tare 0.1518 (mg) = 0.4135 mg
Total 0.6443

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2CL2 75 ml
Final 74.1511 (mg) - Tare 73.3069 (mg) net 844.2 mg
- Blank((0.0213 mg/ml)(75 ml) = 1.598 mg) = 842.6 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.

Final 73.4734 (mg) - Tare 72.4507 (mg) net 1022.7 mg
- Blank ((0.0079 mg/ml)(253 ml total
- ~~64.3~~ 54.2 ml condensed = ______ ml) = ~~1.491~~ 1.57 mg) = 1021.~~2~~ .13 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Acetone 370 ml
Final 72.9635 (mg) - Tare 71.3013 (mg) net 1662.2 mg
- Blank ((0.045 mg/ml)(370 ml) = 16.65 mg) = 1645.6 mg

VI. Other particulate catches. = ______ mg

VII. Total particulate = I+II+III+IV+V+VI = ~~4104~~ mg
~~10547~~
4748

Blanks

Acetone Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = 0.045 mg/ml

Methylene chloride Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = 0.0213 mg/ml

Water Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = 0.0079 mg/ml

Other Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
1315	45	45	45	50
16	50	4.5	50	40
17	40	35	40	50
18	40	35	50	50
19	45	35	50	50
1450	40	30	35	30
51	45	45	45	40
52	55	50	50	50
53	40	40	40	40
54	45	35	30	30
1535	25	25	25	30
36	25	30	30	20
37	30	30	30	30
38	30	30	30	30
39	30	30	30	30

Time	0	1/4	1/2	3/4

Stove Name __________

Date 8/5/81

Clock Times (24 H) 1242-

Run # 5

Phase # —

Observer PET

Distance to Source ~50ft

Direction to Source NE

Wind Direction NW

Wind Velocity 0-2

Cloud Cover [illegible].0

Plume Background trees

Stability __________

Relative Humidity __________

Type Contaminant __________

Color white

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

_____ Units No. __________

Minutes of Observation __________

Bacharach Smoke Spot

Run 5 Date 8/5/81 Operator JC

Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value	Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value
32	1320	Sample	[illegible]	8					
33	1339	Outlet	175	7					
34	1426	S	252	8					
35	1428	0	160	7					
36	1453	S	257	7					
37	1455	0	160	6					
38	1531	S	245	5					
39	1533	0	155	4					

Comments:

ORSAT DATA

Stove Name ______ Date 8/5/81

Run # 5 Phase # 1 Operator JC

Sample Time 1256

	CO_2	O_2	? CO	N_2
Accumulative	8.2	20.2	18.7	—
Net	8.2	12	—	—

Sample Time 1320

	CO_2	O_2	CO	N_2
Accumulate	6.2	20.0	20.4	—
Net	6.2	13.8	0.4	—

Sample Time 1345

	CO_2	O_2	CO	N_2
Accumulate	6.2	19.6	21.8	—
Net	6.2	13.4	2.2	—

Sample Time 1410

	CO_2	O_2	CO	N_2
Accumulate	6.4	19.4	20.4	—
Net	6.4	13	1.0	—

Sample Time 1434

	CO_2	O_2	CO	N_2
Accumulate	5.5	19.2	20.2	—
Net.	5.5	13.7	1.0	—

ORSAT DATA

Stove Name ____________ Date 6/5/81

Run # 5 Phase # — Operator JC

Sample Time ~~12~~ 1455

	CO_2	O_2	CO	N_2
Accumulative	5.8	19.2	20.0	___
Net	5.8	13.4	0.8 ?	___

Sample Time ~~1413~~ 1513

	CO_2.	O_2	CO	N_2
Accumulate	5.8	19.0	19.8	___
Net	5.8	13.2	~~6.6~~ 0.8	___

Sample Time ~~1340~~ 1540

	CO_2	O_2	CO	N_2
Accumulate	5.4	19.4	20.0	___
Net	5.4	13.0	0.6	___

Sample Time ~~1410~~ 1610

	CO_2	O_2	CO	N_2
Accumulate	4.8	19.2	19.5	___
Net	4.8	14.4	0.3	___

Sample Time ____________

	CO_2	O_2	CO	N_2
Accumulate	___	___	___	___
Net	___	___	___	___

Moisture Data

Stove Name

Date 8/5/81

Run # 5

Phase # -

Operator JC

Time (24 H)	Temperature		Moisture Percent
	Wet Bulb	Dry Bulb	
1258	148	345	19
1316	134	240	14
1342	130	270	11
1407	120	275	7
1432	124	278	8
1451	126	285	8
1538	115	280	5

.158

Wood Moisture

Date 8/5/81 Test Run # 5

Operator JC

Meter Measurement

FUEL	#	A	B	C	D	E	F	G	H	AVE	
1	54	12	16.5	17	14.5	20	19.5	19.5	16	16.9	
2	60	13	13.5	14	10.5	11	13	13	13	12.6	
3	61	11	12	12	10	12	12.5	12	11	11.6	
4	59	11	12	13	12	12	15	13	12.5	12.6	
5	62	11	12	13	13	11	13	12.5	11	12.1	
6	63	11	15.5	13	12	11	14	13	10	12.4	
7	64	11	12	12	10	11.5	12	13	12	11.7	
8	65	11	12	11	9.5	12.5	13.5	11.5	10	11.4	
9	66	11	14	15.5	13	12	15	15	13	13.6	
10							Uncorrected Ave. = 12.77				
11											
12											
Kindling											

Total Mass 26 lbs

Percent Moisture 14 %

Total Mass (Dry Basis) 22.4 lbs

Sep 15 ''

160

page 1 of 1

Operating Parameters

Run # 6 Date 8-6-81 Clock Time (24 H) 9:15 Operator

Stove Name

Fuel: Initial Charge (lb) 27.3 Remaining Coal Bed (lb)

Test Charge 8 pieces 24.9 lb; Kindling Several pieces 2.4 lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	~~Opacity~~ O_2 Meter %	Catalyst Pre	Catalyst Post	CO %	CO_2 %	HC ppm		
0	27.3											
5	23.1		796	200	7.5			2.5	13.0	200	30%	CLOSED DAMPERS to 1/2 turn OPEN @ 9:20
10	22.0		535	320	8.5			1.2	7.5	225	25%	opened damper to 1 full turn @ 9.26
15	20.7		659	400	11.5			1.1	10.5	200	18%	CLOSED to 3/4 OPEN @ 9.29
20	19.5		716	440	12.5			1.0	7.5	200	18%	CLOSED TO 1/2 turn open @ 9.36
25	18.7		525	450	14.25			1.3	5.5	340	35%	OPENED to 5/8 open @ 9:39
30	17.9		569	430	15.0			1.2	5.5	270	40%	
35	16.8		528	420	14.5			1.3	6.0	270	40%	
40	16.2		514	410	15.0			1.2	5.0	260	40%	Open DAMPERS to 7/8 open
45	15.3		571	400	14.5			1.0	7.0	215	25%	
46	15.2		569	410	14.0			.8	6.0	190	20%	END of Run #6

Comment Number:

pag. 1 .. 2

15" S
STOP
TEST

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ 1.84 Date 8/6/81 Train Operators DLP

Run # 6 Phase # ______ Clock Time (24 H) 0914—1000 Cp= .803

Sample Box # NAPP #1 Stack Dimensions 8" Ø

Probe Length 6' Barometric Pressure 29.82" Hg

Probe Material GLASS Nozzle Diameter 0.625" Ø

leak check <.02CFM @ 15" VAC

COLD START – medium % M fuel (224#)

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			TRANSM.	Comments	CHAMBER
			Calc.	Act.		T in	T out			Imp.	WB	DB	#7	%M	#8
0	332.689			.35	151								239		
1		0.10		.35										est. ~20	
1.5		.006		.40	437	78	77	0	293	72			473		1234
3	333.76	.007	.34	.40	667								557		
4.		.007	.34	.40	699								543		1174
5		.004	.20	.25	703	78	77	0	300	68			502		
6.5		.003	.15	.17	564								335		709
8	335.27	.003	.15	.17	460								309		646
10		.003	.20	.22	375	79	78	0	311	66			277		
12		.003	.20	.22	342								319	est. 18	
15	337.13	.003	.20	.22	368	81	80		290	66			301		669
19	338.21	.003	.22	.25	338			5.5					267	18	
24	339.42	.003	.22	.25	307	84	83	7	299	67			217		
30	341.09	.003	.25	.27	294	86	85	12.5	311	65			221		570
37		.003	.25	.27	279			18					212	14	

page 2 of 2

Oregon Method 7 Sampling Data Sheet

Stove Name ________ H@ ________ Date 8/6/81 Train Operators ________

Run # 6(cont) Phase # ________ Clock Time (24 H) ________

Sample Box # ________ Stack Dimensions ________

Probe Length ________ Barometric Pressure ________

Probe Material ________ Nozzle Diameter ________

Elapsed Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			TRANS.	Comments
			Calc.	Act.		T in	T out			Imp.	WB	DB	#7	O_2 M
40	343.88	.003	.27	.27	273	88	87	23	315	66			.207	est 14
42	344.40	.003	.27	.15	272			23.5					217	
44		.003	.27	.11	292	87	88	23.5	312				237	
46	345.215													

Environmental Services
1380 NW Lancashire Ct
Beaverton, OR 97006
(503) 645-9685

OMNI

SOURCE SAMPLING-LABORATORY ANALYSIS OF PARTICULATE SAMPLE

Test Run #2　　Project # 85048

Date of Test 8-6-81

CONDENSED WATER DETERMINATION

Impinger:	#1	#2	#3	#4	Total Condensate
Final weight	565.6	540.5	428.7	719.5	
Initial weight	533.1	537.4	428.5	714.1	
Net weight	32.5	3.1	0.2	5.4	41.2

35.80

FILTER IDENTIFICATIONS

Front Filter-First Filter #057　　Back Filter-First Filter# 207

Front Filter-Second Filter #　　Back Filter-Second Filter#

OTHER INFORMATION, COMMENTS

Coupon #IV (TRANS.)
Coupon V (Bottom)

#1 - 130 ml
#2 - 102 ml

ORSAT DATA

	CO_2	O_2	CO	N_2
Analysis 1				
Analysis 2				
Analysis 3				
Average				

Time

Test conditions:

CO_2	O_2	CO	N_2
Atomic Wt. (44)	Atomic Wt. (32)	Atomic Wt. (28)	Atomic Wt. (28)

.163<

M_d=

= Total Atomic Wt.

Enivironmental Services, Inc.
10260 SW Nimbus Ave., M-8
Portland, Ore. 97223
(503) 620-7337

OMNI

LABORATORY TOTAL PARTICULATE CALCULATIONS

Client Del-Green Source Description
Plant Date(s) Analysis 8-6 -8-10 1981
Sampling Date(s) 8-6-81 Run # 6 Project # P5048

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 266 (ml) of Acetone
Final 72.8055 (mg) - Tare 72.6263 (mg) net 179.2 mg
- Blank ((0.045 mg/ml)(266 ml) = 11.47 mg) = 167.2 mg

II. Filter catch(es). F# 57 B# 207
Front filter Final 0.5516 (mg) - Tare 0.4640 (mg) 0.0876 g
+ Back-up filter Final 0.4773 (mg) - Tare 0.1521 (mg) = 0.3252 ~~mg~~ g
0.4127 g

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2 CL 2 85 ml
Final 71.4882 (mg) - Tare 71.3365 (mg) net 151.7 mg
- Blank((0.0213 mg/ml)(75 ml) = 1.71 mg) = 149.9 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.

Final 70.9073 (mg) - Tare 70.7020 (mg) net 205.3 mg
- Blank ((0.0079 mg/ml)(230 ml total
- ~~41.2~~ 35.8 ml condensed = ~~188.8~~ 194.2 ml) = ~~1.49~~ 1.53 mg) = 203.~~8~~7 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Acetone 307 ml
Final 72.1628 (mg) - Tare 71.7897 (mg) net 373.1 mg
- Blank ((0.045 mg/ml)(307 ml) = 13.8 mg) = 359.3 mg

VI. Other particulate catches. = mg

VII. Total particulate = I+II+III+IV+V+VI = ~~1508~~ mg
1293

Blanks

Acetone Final (mg) - Tare (mg)
= mg/ ml = mg/ml

Methylene chloride Final (mg) - Tare (mg)
= mg/ ml = mg/ml

Water Final (mg) - Tare (mg)
= mg/ ml = mg/ml

Other Final (mg) - Tare (mg)
= mg/ ml = mg/ml

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
0940	50	40	40	45
41	45	45	45	45
42	40	35	45	45
43	40	35	50	50
44	50	50	50	50
		Ave	= 46	

Time	0	1/4	1/2	3/4

Stove Name
Date 8/6/81
Clock Times (24 H) 0930
Run # Run #6
Phase # cold start
Observer PET
Distance to Source ~50 ft
Direction to Source NE
Wind Direction ~
Wind Velocity ~
Cloud Cover 0
Plume Background Trees
Stability very
Relative Humidity ~
Type Contaminant woodsmoke
Color white

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

Units No.

Minutes of Observation

Bacharach Smoke Spot

Run [illegible] Date [illegible] Operator [illegible]

Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value	Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
41	[illegible]	[illegible]	[illegible]	[illegible]					
Run # 7									
42	1254	S	437	8					
43	1255	0	250	8					
44	1315	S	409	7					
45	1317	0	220	7					
46	1403	S	333	7					
47	1440	0	215	4					
48									
49									

Comments:

ORSAT DATA

Stove Name __________ Date [illegible]

Run # 6 Phase # __________ Operator JC

Sample Time 0923

	CO_2	O_2	CO	N_2
Accumulative	7.0	19.6	20.0	
Net	7.0	11.6	~~7.4~~ 0.4	

Sample Time 0954

	CO_2	O_2	CO	N_2
Accumulate	5.2	19.6	20.4	
Net	5.2	14.4	0.8	

Sample Time __________

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Sample Time __________

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Sample Time __________

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Opacity Transmissometer Measurement

Run ________ Date [illegible] Operator ________

Pretest Calibration OK ________ Post Test Calibration OK ________

Clock Time	Opacity* %	Flue Gas Temp** at Meter	Clock Time	Opacity* %	Flue Gas Temp** at Meter
Log #	Average	Diameter	Log #	Average	Diameter [illegible]
67	27	12"	72	29	17
68	23	15	73	23	14
~~6~~74	22	13	70	21	13
75	25	15	70	27	13
76	22	12	81	23	15
78	23	12	82	31	17
71	25	13	83	29	17
			84	20	13

Ave. for total load 24 %

Average for total load 25 %

* Record every 15 minutes
** Record every 5 minutes

Moisture Data

Stove Name ______________________ Date ____________

Run # ________ Phase # ________ Operator ____________

Time (24 H)	Temperature		Moisture Percent
	Wet Bulb	Dry Bulb	
0937	150	410	18
0948	138	300	14

170^

page 1 of 4

Operating Parameters

Run # 7 (hot start) Date 8-6-8 Clock Time (24 H) 11:49 Operator SEJ

Stove Name

Fuel: Initial Charge (lb) 28.3 Remaining Coal Bed (lb) 2.2 (TARED)

Test Charge 8 pieces 28.3 lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES Combustion Air	Combustion Chamber	Stove Surface	~~Opacity~~ O2 Meter %	Catalyst Pre	Catalyst Post	NDIR CO %	NDIR CO_2 %	NDIR HC ppm	Opacity	Comments (Footnotes)
0	28.3											
5	27.0		648	430	16.5			1.7	13.0	325	20%	DAMPERS FULL OPEN
10	25.4		594	525	16.5			.8	6.0	125	25%	DAMPERS to 3/4 open @ 11:57
15	24.7		580	525	13.5			.8	7.0	130	35%	open to 7/8 @ 12:0
20	23.2		586	585	13.5			.8	7.5	160	25%	
25	22.4		490	540	14.0			.9	5.0	190	55%	open to 1 turn @ 12:17
30	22.0		428	470	16.0			1.0	3.0	180	40%	DAMPERS to FULL OPEN
35	20.5		653	460	8.5			.4	9.0	160	40%	DAMPERS to 3/4 OPEN @ 12:2
40	19.6		606	550	13.5			1.1	7.0	200	40%	DAMPERS to 1 turn OPEN @ 12:27
45	18.4		735	600	10.5			1.4	12.0	200	20%	CLOSED to 1/2 open @ 12:35
50	17.1		739	610	11.5			1.2	11.0	125	20%	
55	16.2		750	600	12.0			1.2	11.0	200	20%	CLOSED DAMPER to 3/8 open @ 12:45
60	15.3		696	590	13.0			1.1	7.5	210	18%	
			[illegible]	[illegible]	[illegible]			12.4	99	2205	358	

Comment Number:

page 2 of 4

Operating Parameters

Run # 7 Date 8-6-81 Clock Time (24 H) ______ Operator ASP

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	O_2 ~~Opacity~~ Meter %	Catalyst Pre	Catalyst Post	CO %	CO_2 %	HC ppm		
65	14.3		677	580	12.5			1.1	7.5	200	20%	CLOSED TO (1/4) @ 12:54
70	13.2		673	580	12.0			1.4	9.5	270	40%	
75	12.8		613	580	13.0			1.0	7.0	220	30%	DAMPERS to 1/2 open @ 13:05
80	12.2		640	560	12.5			1.1	8.0	240	25%	
85	11.3		659	560	13.0			1.4	7.5	290	30%	
90	10.7		664	575	12.0			1.1	8.5	240	20%	
95	9.7		669	575	12.5			1.0	8.0	220	20%	
100	9.0		648	550	13.0			1.1	8.5	230	25%	
105	8.6		615	550	13.5			1.1	7.0	240	40%	
110	8.0		585	525	14.0			1.2	6.0	255	35%	
115	7.7		565	500	14.5			1.3	5.5	250	35%	OPEN DAMPER to 5/8 OPEN @ 13:46
120	7.1		633	480	13.5			1.2	6.0	250	35%	
125	6.7		621	480	13.5			1.3	7.0	275	40%	
			8262	7095	169.5			15.6	96	3180		

Comment Number:

172

pa[illegible] 3 [illegible]

Operating Parameters

Run # 7 Date 8-6-81 Clock Time (24 H) ______ Operator ______

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	O2 ~~Opacity~~ Meter %	Catalyst Pre	Catalyst Post	CO %	CO_2 %	HC ppm		
130	6.1		602	490	13.5			1.4	7.0	300	50%	
135	5.6		559	470	14.0			1.3	6.0	300	50%	
140	5.1		561	480	13.5			1.5	6.5	350	35%	open DAmpER to 3/4 open
145	4.9		582	460	14.0			1.2	6.0	250	25%	
150	4.4		560	450	13.5			1.2	6.0	250	20%	
155	4.0		564	460	14.0			1.0	5.5	210	20%	
160	3.8		583	470	14.0			1.0	7.0	140	20%	
165	3.6		597	460	14.0			1.1	5.0	130	20%	
170	3.2		609	450	14.0			1.1	5.0	105	20%	
176	2.9		579	450	14.0			1.2	5.0	100	20%	
180	2.8		569	440	14.25			1.3	5.0	80	20%	
185	2.6		590	430	14.5			1.2	5.0	60	20%	
190	2.5		595	420	14.5			1.2	5.0	60	20%	
			7550	5930	17175			15.7	74	2335	340	

Comment Number:

page 4 of 4

Operating Parameters

Run # 7 Date 8-6-81 Clock Time (24 H) ______ Operator ______

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES Combustion Air	Combustion Chamber	Stove Surface	O_2 ~~Opacity~~ Meter %	Catalyst Pre	Catalyst Post	NDIR CO %	NDIR CO_2 %	NDIR HC ppm	Opacity	Comments (Footnotes)
195	2.3		572	420	14.75			1.0	5.0	60	20%	
200	2.1		383 -	420	15%			1.0	4.5	60	18%	End of Run #7
			1155	740	29.75			2.0	9.6	120	[illegible]	

Comment Number:

173

174

pa. 1 ___ S--P at ~2.1 lbs

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ ______ Date 8/6/81 Train Operators DLP
Run # 7 Phase # ______ Clock Time (24 H) 1149-1509 Cp = .824
Sample Box # Napp #2 Stack Dimensions 8" 0
Probe Length 3' Barometric Pressure 29.81" Hg
Probe Material Glass Nozzle Diameter 0.502" 0

medium fuel (% m ≅ 24%)
hot start
leak check < .02 cfm @ 18" Hg vac

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments		
			Calc.	Act.		T in	T out			Imp.	WB	DB	#7	% m	#8
0	345.379			.30	318	95	95						254	est 20	432
1		.005		.30	329								258		441
2		.005	.14	.17	332			0	298	78			254		441
3.5		.005	.16	.18	332	95	95	0	299	76			253	est 17	
5		.005	.16	.20	449								384	~10 min/info test about accounts 11.8, 19.8, 20.8	
13	348.89	.004	.13	.15	368	96	95		299	73			244		
16		.004	.13	.15	360			0					254	15	550
21	350.73	.004	.13	.15	362	96	97		299	75			256		
28	352.31	.003	.10	.12	320	98	97		296	74			214		
35	353.68	.004	.15	.17	560	98	100	1	296	76			496		648
45	355.11	.006	.23	.25	542	99	101	6	295	80			374		
63	358.57	.004	.12	.15	435	101	103	8.5	296	77			299	17	
76	360.83	.004	.14	.15	360	102	104	15	295	79			241		
90	363.51	.005	.18	.18	436	104	105	24	293	78			292	17	
105		.004	.14	.16	361	104	105	26	253	75			242		

• STOP 1324
• START 1326
To change filters due to vac.

pag. 2 .. ___

Oregon Method 7 Sampling Data Sheet

Stove Name ________ H@ ________ Date 8/6/81 Train Operators DYP

Run # 7(cont) Phase # ________ Clock Time (24 H) ________

Sample Box # ________ Stack Dimensions ________

Probe Length ________ Barometric Pressure ________ leak check < .02 CFM @ 15" Hg

Probe Material ________ Nozzle Diameter ________

Elapsed Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments		
			Calc.	Act.		T in	T out			Imp.	WB	DB	#7	Em	#8
115	368.75	.004	.14	.16	333	105	107	0	267	73			231		597
126	371.22	.004	.15	.17	356	106	108		279	76			246		
136	373.48	.004	.15	.17	329	107	109	0	286	79			227		
146	376.62	.003	.12	.16	352	108	110		292	78			250		585
161	378.64	.004	.15	.17	337	108	111	0	296	79			239		606
176	382.17	.004	.15	.17	309	109	111	0	293	78			212	3	
190	385.68	.004	.15	.17	298	110	112	0	295	78			212		586
198	387.654														

Oregon Method 7 Sample Recovery Data Sheet

Stove Name ______ Date 8-6-81

Run # 7 Phase # ______ Clock Times (24 H) ______

Box # 2

CONDENSED WATER DETERMINATION

1 184ml
#2- 52ml

Impinger:	#1	#2	#3	#4	Total Condensate
Final Weight	613.7	481.7	429.8	763.1	
Initial Weight	526.3	526.6	429.2	750.8	55.4
Net Weight	87.4	-44.9	0.6	12.3	

$\underbrace{87.4 \quad -44.9 \quad 0.6}_{43.10}$

FILTER IDENTIFICATIONS

⊛ Front Filter-First Filter # 059 Back Filter-First Filter # 208

⊛ Front Filter-Second Filter # 016 Back Filter-Second Filter # ______

WASH IDENTIFICATION

Probe/Front Filter Wash I ⇒

Impinger Wash V ⇒

Blank ______

CREOSOTE COUPONS

Plate Location TOP (TRANS.) Plate Location Bottom

Plate Identification 7A Plate Identification 7B

Tape

Date	Mg	Date	Mg

Final

Date	Mg	Date	Mg

Net				

OMNI Environmental Services, Inc.
10260 SW Nimbus Ave., M-8
Portland, Ore. 97223
(503) 620-7337

OMNI

LABORATORY TOTAL PARTICULATE CALCULATIONS

Client DBL-GREEN Source Description ____
Plant ____ Date(s) Analysis [illegible]
Sampling Date(s) 8-6-81 Run # 7 Project # PS048

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 230 (ml) of Acetone
Final 72.8982 (mg) - Tare 72.6099 (mg) net 288.3 mg
- Blank ((0.045 mg/ml)(230 ml) = 10.35 mg) = 277.95 mg

FO TWO FRONT FILTERS # 059 # 016

II. Filter catch(es). F# ~~016~~ 059 B# 208
Front filter #59 Final 0.5570 (mg) - Tare 0.4647 (mg) 0.0923 } total 0.1206 g
+ Back-up filter Final 0.4998 (mg) - Tare 0.4715 (mg) = 0.0283 mg
#208 → Final 0.5820 g - Tare 0.1528 net 0.4292 g

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2CL2 85 ml
Final 73.9434 (mg) - Tare 73.7595 (mg) net 183.9 mg
- Blank ((0.0213 mg/ml)(85 ml) = 1.811 mg) = 172.09 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.

Final 73.9716 (mg) - Tare 73.6290 (mg) net 342.6 mg
- Blank ((0.0079 mg/ml)(232 ml ml total
- ~~55.4~~ 43.10 ml condensed = 176.6 ml) = 1.39 mg) = 341.2 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Acetone 346 ml
Final 68.3022 (mg) - Tare 67.9192 (mg) net 383.0 mg
- Blank ((0.045 mg/ml)(346 ml) = 15.57 mg) = 367.4 mg

VI. Other particulate catches. = ____ mg

VII. Total particulate = I+II+III+IV+V+VI = ~~1548~~ mg
1718.35

Blanks

Acetone Final ____ (mg) - Tare ____ (mg)
= ____ mg/ ____ ml = ____ mg/ml

Methylene chloride Final ____ (mg) - Tare ____ (mg)
= ____ mg/ ____ ml = ____ mg/ml

Water Final ____ (mg) - Tare ____ (mg)
= ____ mg/ ____ ml = ____ mg/ml

Other Final ____ (mg) - Tare ____ (mg)
= ____ mg/ ____ ml = ____ mg/ml

177

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
1233	25	20	25	25
34	30	30	30	30
35	25	25	25	25
36	25	25	25	30
37	25	30	35	40
1335	25	30	30	35
36	30	35	40	40
37	35	35	40	40
38	35	35	35	40
39	40	40	40	40
1430	20	15	20	20
31	15	15	15	15
32	20	20	25	20
33	20	20	20	20
34	20	20	20	20

Time	0	1/4	1/2	3/4
Temp at outlet 290°				
Ave = 27.5				
Ave = 36				
Ave = 19				

Stove Name ________

Date 8/6

Clock Times (24 H) 1151

Run # 7

Phase # hot start

Observer PET

Distance to Source 250ft

Direction to Source NE

Wind Direction ~

Wind Velocity ~ 0-2

Cloud Cover 0

Plume Background trees

Stability very

Relative Humidity ________

Type Contaminant ________

Color white

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

____ Units No. ________

Minutes of Observation ________

ORSAT DATA

Stove Name ______________ Date ______________

Run # 1 Phase # ______ Operator ______________

Sample Time ______

	CO_2	O_2	CO	N_2
Accumulative	11.8	19.8	20.8	___
Net	11.8	~~19.8~~ 8.0	~~20.8~~ 1.0	___

Sample Time 1220

	CO_2	O_2	CO	N_2
Accumulate	7.4	19.8	20.0	___
Net	7.4	12.4	0.2	___

Sample Time 1230

	CO_2	O_2	CO	N_2
Accumulate	7.2	19.4	19.8	___
Net	7.2	12.2	0.4	___

Sample Time 1258

	CO_2	O_2	CO	N_2
Accumulate	8.6	19.8	20.0	___
Net	8.6	11.2	0.2	___

Sample Time 1327

	CO_2	O_2	CO	N_2
Accumulate	6.8	19.8	200	___
Net	6.8	13.0	0.2	___

Opacity Transmissometer Measurement

Run ______ Date [illegible] Operator [illegible]

Pretest Calibration OK ______ Post Test Calibration OK ______

Clock Time	Opacity* %	Flue Gas Temp** at Meter	Clock Time	Opacity* %	Flue Gas Temp** at Meter
Log #	Average	Diameter	Log #	Average	Diameter (in)
67	27	12"	72	29	17
68	23	15	73	23	14
74	22	13	70	21	13
75	25	15	80	27	13
76	22	12	81	23	15
78	23	12	82	31	17
71	25	13	83	29	17
			84	20	13
Ave. for total load	24 %		Average for total load	25 %	

180<

* Record every 15 minutes
** Record every 5 minutes

Moisture Data

Stove Name ______________________ Date ____________

Run # ________ Phase # ________ Operator ____________

Time (24 H)	Temperature Wet Bulb	Temperature Dry Bulb	Moisture Percent
12:08	140	359	~~16.5~~ 13.5
1249	150	460	17
1320	152	480	17
1403	140	360	14
1445	112	330 342	3

.16 182^

Page 1 of 2

Operating Parameters

Run # 8 Date 8-7-81 Clock Time (24 H) ______ Operator SS//

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge 8 pieces 31.9 lb; Kindling Several pieces 3.4 lb ✓ 2.8 lbs

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES Combustion Air	TEMPERATURES Combustion Chamber	TEMPERATURES Stove Surface	O_2 ~~Opacity~~ Meter (%)	Catalyst Pre	Catalyst Post	NDIR CO %	NDIR CO_2 %	NDIR HC ppm	Opacity	Comments (Footnotes)
0	35.3										2	
5	32.1		421	120	16%			1.0	2.0	250	25%	DOORS closed @ 0908 → DAMPER Fully OPEN
10	30.5		396	150	17%			.5	2.5	160	30%	Open DOORS to Poke @ 9:12 then closed
15	29.4		264	180	18%			.4	2.7	110		@0919 open DOORS closed @ 9:21
20	29.7		748	180	17%			.3	3.6	80	10%	ADDED 1.2 lb kindling @09:24 & closed Doors @ 9:25
25	28.5		415	200	18%			.45	2.5	80	10%	ADDED 2.8 lb @ 0932 and CLOSED DOORS @ 0934
35	28.8		1192	250	15%			.35	2.0	120	5%	
40	27.4		1096	290	15%			.50	5.0	100	5%	
45	26.3		814	310	15.5%			.6	2.8	120	10%	
50	25.5		639	280	17.0%			.6	3.0	125	10%	Open DOORS to POKE FIRE @ 9:56
55	24.5		453	250	17.5%			.6	3.0	155	30%	
60	23.9		395	240	18.0%			.65	3.0	155	20%	Opened DOORS to Poke @ 10:09 — Temp FBox (381°F)
75	21.5		289	210	19.0%			.55	2.5	110	18%	10:15 — open DOORS to Remove Comp in Rod and Poke Fire Closed Doors @ 10:18 Temp @ 299°F
			710	200								

Comment Number:

pa- 2 .. 3

Operating Parameters

Run # 8 Date 8/7/81 Clock Time (24 H) ______ Operator ~~S//

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES Combustion Air	Combustion Chamber	Stove Surface	O_2 ~~Opacity~~ Meter %	Catalyst Pre	Catalyst Post	NDIR CO %	NDIR CO_2 %	NDIR HC ppm	Opacity	Comments (Footnotes)
80	20.7		314 ④	200	18.5			.55	2.5	95	18%	DAMPER FULL OPEN
85	20.3		323	200	18.5			.50	2.0	95	18%	
90	19.7		317	200	18.5			.55	2.0	100	10%	
95	19.4		303	190	18.5			.50	2.0	95	15%	
100	19.0		320	190	18.5			.60	2.0	100	10%	
105	18.4		331	190	18.5			.45	2.0	80	12%	
110	17.9		317	190	18.0			.45	2.5	80	10%	
115	17.3		337	200	18.0			.45	2.6	80	15%	
120	16.6		378	210	17.5			.55	3.0	105	7%	
127	15.1		447	270	17.5			.55	3.0	100	5%	
132	14.4		472	300	17.0			.60	3.6	120	5%	
135	13.9		474	310	17.0			.65	3.5	130	5%	
140	13.2		451	320	17.0			.70	3.0	125	5%	

2770 [illegible] 7.1 [illegible] 1305

Comment Number:

page 3 [illegible]

Operating Parameters

Run # 8 Date 8-7-81 Clock Time (24 H) ______ Operator SSM

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES			O_2 ~~Opacity~~ Meter %			NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface		Catalyst Pre	Catalyst Post	CO %	CO_2 %	HC ppm		
145	12.6		428	310	17.5			.75	3.0	120	5%	
150	12.1		418	300	17.0			.70	3.0	110	8%	
155	11.6		412	280	17.5			.75	3.0	110	10%	End of Burn
			1258	840	42.0			220	9.0	40		

Comment Number:

pa 1 2 ~11.5 lbs.

Oregon Method 7 Sampling Data Sheet

Stove Name ______ Ḣ@ 1.84 Date 8-7-81 Train Operators DCP
Run # 8 Phase # ______ Clock Time (24 H) 0905-2114 on leak ck <.02CFM @ 18" Va
Sample Box # N App #1 Stack Dimensions 8"Ø high &M fuel (Green) ~55
Probe Length 6' Barometric Pressure 29.77"Hg short test W.F
Probe Material Glass Nozzle Diameter 0.625"Ø Cp = 0.803 (J.C.)

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			TRANS. T #7	Comments &M	CHAMBER T #8
			Calc.	Act		T in	T out			Imp.	WB	DB			
0	388.007			.40	129									~25 est.	
.5				.40	145								173		
1		.12		.40	182	80	79	0	291	82			235		367
2.5		.08		.40	302								308		548
4	389.47	.004	.25	.25	378	80	80	0	293	77			315		
6.5		.003	.18	.23	361								254		
9		.003	.18	.23	325	81	81	0	304	78			257		
11.5	391.59	.003		.23	292								208		324
14.5	392.47			.23	215	83	82			75			164	9(?)	
17.5		.016		.35	185			0	296	78			147		
22		.003		.23	315	86	86		293	82			266	0(?)	565
26	395.73	.003	.26	.25	292	87	87	0	289	76			222	est 20	
31.3		.007		.35	482	88	89		297	69			414		1375
35	398.49	.008		.45	542	90	90	0	289	70			413		
38.5		.005	.39	.43	385			0	269	73			513	30	

* Doors open + more kindling added (Times approx.)

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ ______ Date 8-7-81 Train Operators DLP
Run # 8(CMT) Phase # ______ Clock Time (24 H) ______
Sample Box # ______ Stack Dimensions ______
Probe Length ______ Barometric Pressure ______
Probe Material ______ Nozzle Diameter ______

Elapsed Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments		
			Calc.	Act.		T in	T out			Imp.	WB	DB	#7	%m	#8
43	401.46	.004	.22	.25	421	93	93	0	273	70			304	30	
50	403.73	.003	.16	.18	302	94	95	0	291	68			244		
Note 57	404.99	.003	.16	.18	268	95	97	12	307	76			227	8	435
* 66	406.76	.003	.16	.18	252	94	99	23	300	76			213		
68		.003	.16	.20	208	95	97	0	205	82			208		
80	410.24	.003	.16	.20	230	98	99	0	305	69			191		323
106	417.88	.004	.41	.41	243	99	102	0	212	74			219	est 10	
120	422.78	.005	.52	.55	347	101	102	0	304	67			280	12	
136	429.42	.005	.46	.48	308	102	103	0	211	74			260		443
145	433.01	.004	.36	.39	295	103	104	0	281	66			240		418
150 ~~[illegible]~~	434.677 ~~[illegible]~~				270	101	104	0	266	74			232		412

Note 1012 STOP } TO CHANGE FRONT filter
1016 START }

* Door open also

Oregon Method 7 Sample Recovery Data Sheet

Stove Name ____________ Date 8-7-81
Run # 8 Phase # ____ Clock Times (24 H) ____
Box # 1

CONDENSED WATER DETERMINATION

1-166ml
106ml

Impinger:	#1	#2	#3	#4	Total Condensate
Final Weight	601.4	541.9	430.0	729.2	
Initial Weight	542.4	537.3	428.5	718.9	
Net Weight	59.0	5.6	1.5	10.3	76.40 TOTAL

66.10

FILTER IDENTIFICATIONS

Front Filter-First Filter # 063 Back Filter-First Filter # 209
Front Filter-Second Filter # 062 Back Filter-Second Filter # ____

WASH IDENTIFICATION

Probe/Front Filter Wash ____
Impinger Wash ____
Blank ____

CREOSOTE COUPONS

Plate Location 8A Plate Location 8B
Plate Identification TOP ⇒ (TRANSMISSometre) Plate Identification Bottom

Tape

	Date	Mg	Date	Mg
Final				
Net				

Laboratory Total Particulate Calculations

Stove Name ______ Date of Sampling 8-7-81
Run # 8 Phase # ______ Date of Analysis ______
Box # 1 Analyst ______

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 172 (ml) of Acetone
Final 70.9681 (mg) - Tare 70.8395 (mg) net 128.6 mg
- Blank ((0.045 mg/ml)(172 ml) = 7.74 mg) = 120.86 mg

2 front filters ② Filter catch(es). F#~~002~~ 063 B# 209
Front filter #63 Final 0.5582 (mg) - Tare 0.4667 (mg) net 0.0915
+ Back-up filter #62 Final 0.5410 (mg) - Tare 0.4702 (mg) = 0.0708 mg
#209 0.2095 0.1524 0.0571
Σ 219.4 mg

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2CL2 85 ml
Final 74.7354 (mg) - Tare 74.5468 (mg) net 188.6 mg
- Blank ((0.0213 mg/ml)(85 ml) = 1.81 mg) = 186.8 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.

Final 71.0643 (mg) - Tare 70.8300 (mg) net 234.3 mg
- Blank ((0.0074 mg/ml)(283 ml total
- ~~764~~ 66.10 ml condensed = ~~234.3~~ 216.9 ml) = 1.632 mg) = 232.~~7~~59 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Acetone 353 ml
Final 74.4329 (mg) - Tare 74.0624 (mg) net 370.5 mg
- Blank ((0.045 mg/ml)(353 ml) = 15.88 mg) = 354.6 mg

VI. Other particulate catches. = ______ mg

VII. Total particulate = I+II+III+IV+V+VI = 1114.25 mg

Blanks

Acetone Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Methylene chloride Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Water Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Other Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Bacharach Smoke Spot

Run [illegible] Date [illegible] Operator [illegible]

Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value	Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value
[illegible]	[illegible]		[illegible]	9					
[illegible]	[illegible]	[illegible]	[illegible]	8					
50	1012	S	250	5					
51	1014	O	170	4					
52	1134	S	296	4					
53	1137	O	200	4					
		S							
1									
Run # 9									
54	1306	S	316	7					
55	1308	O	270	6					
56	1456	S	270	7					
57	1458	O	200	7					
59	~~[illegible]~~ 1540	S	321	7					
60	1546	O	240	6					

Comments:

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4	Time	0	1/4	1/2	3/4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
41	25	25	[illegible]	20					
42	25	25	25	20					
43	20	20	25	25					
44	25	25	25	25	Ave=	25			
1100	20	20	15	15					
01	15	15	15	10					
02	10	10	10	15					
03	10	10	15	10					
04	10	15	15	15	Ave=	14			

Stove Name ________

Date [illegible]

Clock Times (24 H) [illegible]30

Run # Run #8

Phase # cold start

Observer FE

Distance to Source ~50ft

Direction to Source NE

Wind Direction N

Wind Velocity V 0-1

Cloud Cover 0

Plume Background trees

Stability ________

Relative Humidity ________

Type Contaminant ________

Color white

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

____ Units No. ________

Minutes of Observation ________

1190<

ORSAT DATA

Stove Name ____________ Date [illegible]

Run # [illegible] Phase # ________ Operator [illegible]

Sample Time [illegible]

	CO_2	O_2	CO	N_2
Accumulative	3.6	20.2	20.2	
Net	3.6	16.6	–	

Note: There is a problem with the CO absorbtion. The readings from the calibration gas are very low.

Sample Time 1019

	CO_2	O_2	CO	N_2
Accumulate	2.4	20.2		
Net	2.4	17.8		

Sample Time 1140

Note: 1140 - ~~[illegible]~~ Switched to other orsat (portable)

	CO_2	O_2	CO	N_2
Accumulate	2.4	19.6	20.0	
Net	2.4	17.2	0.4	

Sample Time ________

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Sample Time ________

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Reproduced from best available copy.

Moisture Data

Stove Name ______ Date ______

Run # 1 Phase # ______ Operator ______

Time (24 H)	Temperature		Moisture Percent
	Wet Bulb	Dry Bulb	
	~~102~~	~~280~~	
0920	120	220	5
0930	102	280	0
0944	170	570	~30
~~09~~ 1008	117	290	5
	102	230	2
1114	190	390	12

5.4

pa.- 1 .. 3

Operating Parameters

Run # 9 Date 8-7-81 Clock Time (24 H) 13:18 Operator SS

Stove Name

Fuel: Initial Charge (lb) Remaining Coal Bed (lb) 2.2

Test Charge 24.5 lb; Kindling Several pieces 3.1 lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES Combustion Air	Combustion Chamber	Stove Surface	O2 Meter %	Catalyst Pre	Catalyst Post	NDIR CO %	NDIR CO2 %	NDIR HC ppm	Opacity	Comments (Footnotes)
0	29.8											DOORS OPEN
5	27.5		902	390	12			.55	12	90		CLOSED DOORS @ 13:22
10	25.0		1166	440	11.5			.80	13	130	5%	
15	23.1		1251	525	10.5			.70	14	80	0	DAMPERS to 1½ turn OPEN
20	21.5		783	600	13.5			.80	12	150	0	DAMPERS to 2 TURNS OPEN @ 1341
25	20.4		670	575	13.5			.80	9.0	140	0	
30	18.9		633	575	14.5			.60	7.0	100	0	
35	18.0		603	550	15.0			.65	6.5	110	0	
40	17.1		591	525	15.0			.60	5.5	110	0	
45	16.2		555	500	15.0			.65	5.0	125		
50	15.3		546	500	15.0			.65	5.0	120	5%	
55	14.7		554	475	15.75			.60	5.0	115	5%	
60	13.9		583	460	15.50			.60	5.0	115		

Comment Number:

page 2 of 5

Operating Parameters

Run # 9 Date 8/7/81 Clock Time (24 H) ________ Operator SS

Stove Name ________

Fuel: Initial Charge (lb) ________ Remaining Coal Bed (lb) ________

Test Charge ________ pieces ________ lb; Kindling ________ pieces ________ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES			O_2 ~~Opacity~~ Meter %	Catalyst		NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface		Pre	Post	CO %	CO_2 %	HC ppm		
65	12.8		549	450	15.5			.60	5.0	130	5%	
70	12.5		552	440	16.0			.55	4.0	110	5%	
75	11.8		557	430	16.0			.55	3.6	115	5%	
80	11.2		546	430	16.0			.55	3.6	110	5%	
85	10.9		540	430	16.5			.45	3.5	100	5%	
90	10.4		490	430	17.0			.45	3.0	105	5%	OPENED DAMPER TO 2½ turns
95	10.0		457	425	17.0			.45	3.0	100	|	
100	9.6		443	400	17.0			.50	3.0	100	5%	
105	9.3		380	453	17.5			.45	3.0	100	8%	
110	9.0		360	497	18.0			.45	3.0	90	8%	
115	8.6		478	350	17.5			.45	3.0	100	10%	
120	8.4		459	340	17.75			.47	2.5	110	15%	
125	8.1		436	330	17.5			.45	2.0	105	15%	

Comment Number:

page 3 of 3

Operating Parameters

Run # 9 Date 8-7-81 Clock Time (24 H) ______ Operator ______

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	~~Opacity~~ O2 Meter %	Catalyst Pre	Catalyst Post	CO %	CO2 %	HC ppm		
130	7.8		416	310	18.0			.35	2.0	70	5%	
135	7.5		992	300	18.0			.14	4.0	110	5%	opend doors @ 15.32 to poke
140	6.8		1099	380	16.5			.34	3.0	80	5%	
145	6.4		615	400	16.0			.40	3.0	75	5%	
150	6.1		604	400	17.0			.40	3.0	75	5%	
155	5.8		567	400	17.5			.40	3.0	80	5%	
160	5.5		582	390	17.5			.37	3.0	65	5%	
165	4.9		614	390	17.0			.27	3.5	50	5%	
170	4.6		550	400	17.5			.32	3.0	55	5%	
175	4.3		504	390	17.75			.30	2.5	50	5%	
180	4.1		490	390	17.0			.30	2.5	50	5%	
185	3.8		477	380	17.5			.30	2.5	45	5%	
189	3.6		407	370	17.75			.30	2.5	45	5%	@16:27

Comment Number:

196<

pa. 1 ___

S.E. 1b
stop

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ 1.84 Date 8/7/81 Train Operators Dyp

Run # 9 Phase # ______ Clock Time (24 H) 1318-1627

Sample Box # Wopp #2 Stack Dimensions 8" Ø

Probe length 3' Barometric Pressure 29.75

Probe Material Glass Nozzle Diameter 0.502 " Ø

HIGH % m fuel

leak check <.002cfm @ 20" vac

Cp = .824

hot START

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Trans. T #7	Comments % m	Chamber #8
			Calc.	Act.		T in	T out			Imp.	WB	DB			
0	434.773			.40	211	105	105	0	295				216	est 30	
* 1.5				.40	285			0					265		
2.5	435.78	.005		.40	368					82			313		734
3.5		.005	.13	.15	441	105	105			80			349		
7	436.93	.005	.13	.15	461					*			388		
11	437.79	.004		.15	547	106	106	0	261	83			426		
14		.004	.10	.15	660								482		1255
17	438.9	.004	.10	.13	514	106	106	0	290	85			383		
22	439.75	.005	.13	.15	399	106	107	0	262	82			343		
28		.005	.40	.43	332	107	107	1	218	75			533	est 20	644
39	444.63	.005	.40	.43	367	109	109	2	285	72			309		
50	447.91	.004		.30	317	111	111	7	286	81			285	16	
* 55	449.36	.005		.43	330			18					285		
60		.004	.15	.18	334	111	112	0	245	80			275		
70	453.17	.006		.20	332	112	114	0	262	82			286		

* 1414 STOP
1416 START } for filter change

* suspect erroneously HIGH T's, ice bath looks v. good

pg. 2 ___

Oregon Method 7 Sampling Data Sheet

Stove Name ________ H@ ________ Date 8/7/81 Train Operators DCP

Run # 9(cont) Phase # ________ Clock Time (24 H) ________

Sample Box # ________ Stack Dimensions ________

Probe Length ________ Barometric Pressure ________

Probe Material ________ Nozzle Diameter ________

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments		
			Calc.	Act.		T in	T out			Imp.	WB	DB	#7	Em	H8
80	455.69	,006		.23	333	112	113	0	274	80			269	10	555
95	460.01	,004	.18	.20	279	113	113	1	282	82			286		
~~[illegible]~~ 112	464.27	,005	.22	.25	222	112	114	1	288	80			217		490
133	470.32	,005	.22	.25	365	113	115	1	289	80			357		1045
143	473.31	,004	.18	.20	319	113	114	1	289	82			277		
165	478.86	,004	.18	.20	262	113	115	1	289	85			270	8	
185	484.14	,003	.13	.15	257	113	115	0	289	85			225		
187	484.591														

Oregon Method 7 Sample Recovery Data Sheet

Stove Name ______ Date 8-7-81

Run # 9 Phase # ______ Clock Times (24 H) ______

Box # 2

CONDENSED WATER DETERMINATION

#1 -150ml
#2-98ml

Impinger:	#1	#2	#3	#4	Total Condensate
Final Weight	589.1	532.1	430.3	771.4	
Initial Weight	528.8	527.3	429.1	762.3	~~TOTAL~~
Net Weight	60.3	4.80	1.2	9.1	75.40

66.3

FILTER IDENTIFICATIONS

Front Filter-First Filter # ~~062~~ 079 Back Filter-First Filter # 210

Front Filter-Second Filter # 078 Back Filter-Second Filter # ______

WASH IDENTIFICATION

Probe/Front Filter Wash ______

Impinger Wash ______

Blank ______

CREOSOTE COUPONS

Plate Location TOP (TRANS) Plate Location Bottom

Plate Identification 9A Plate Identification 9B

Tape

Date	Mg	Date	Mg

Final

Date	Mg	Date	Mg

Net ______ ______ ______ ______

Laboratory Total Particulate Calculations

Stove Name ______ Date of Sampling 8-7-81
Run # 9 Phase # ______ Date of Analysis ______
Box # 2 Analyst ______

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 174 (ml) of Aceton
Final 74.3057 (mg) - Tare 74.0805 (mg) net 225.2 mg
- Blank ((0.045 mg/ml)(174 ml) = 7.83 mg) = 217.4 mg

2 front filters (II.) Filter catch(es). F# ~~079~~ 078 B# 210
Front filter "78 Final 0.5315 (mg) - Tare 0.4716 (mg) 0.0599
+ Back-up filter ~~#~~ Final 0.5304 (mg) - Tare 0.4750 (mg) = 0.0554 mg
"210 0.4599 0.1559 0.3040

III. Hydrocarbon obtained by solvent extraction of water in Σ 419.3 mg
in impingers and bubblers.
Solvent used CH2CL2 85 ml
Final 70.5209 (mg) - Tare 70.3369 (mg) net 184.0 mg
- Blank((0.0213 mg/ml)(85 ml) = 1.81 mg) = 182.2 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.

Final 71.3075 (mg) - Tare 71.0617 (mg) net 245.8 mg
- Blank ((0.0079 mg/ml)(268 ml total
- ~~43.8~~ 66.3 ml condensed = ~~224.2~~ 201.7 ml) = ~~1.77~~ 1.59 mg) = 244~~.10~~.21 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Aceton 314 ml
Final 72.7429 (mg) - Tare 72.2778 (mg) net 465.1 mg
- Blank ((0.045 mg/ml)(314 ml) = 14.13 mg) = 451.0 mg

VI. Other particulate catches. = ______ mg

VII. Total particulate = I+II+III+IV+V+VI = 1514.11 mg

Blanks

Acetone Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Methylene chloride Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Water Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Other Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Bacharach Smoke Spot

Run # 7 Date [illegible] Operator [illegible]

Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value	Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value
48	[illegible]		[illegible]	9					
49	[illegible]	[illegible]	[illegible]	9					
50	1012	S	250	5					
51	1014	O	170	4					
52	1134	S	296	4					
53	1137	O	200	4					
		S							
Run # 9									
54	1306	S	316	7					
55	1308	O	270	6					
56	1456	S	270	7					
57	1458	O	200	7					
59	~~[illegible]~~ 1540	S	321	7					
60	1546	O	240	6					

Comments:

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4	Time	0	1/4	1/2	3/4
1347	10	15	15	10					
48	10	10	10	10					
49	10	10	10	10					
50	15	10	10	10					
51	10	10	10	5	Ave =	10.5			
1455	10	15	20	20					
56	20	20	20	15					
57	15	15	15	15					
58	10	10	15	10					
59	10	10	10	10	Ave -	14.25			
1549	5	5	10	5					
50	5	5	5	5					
51	5	5	5	5					
52	10	10	10	10					
53	5	10	5	10	Ave =	6.75			

Stove Name

Date 8/7/81

Clock Times (24 H)

Run # 9

Phase # hot start-wet wood.

Observer PET

Distance to Source ~50ft

Direction to Source NE

Wind Direction N

Wind Velocity 0-1

Cloud Cover 0

Plume Background trees

Stability

Relative Humidity

Type Contaminant

Color white

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

Units No.

Minutes of Observation

ORSAT DATA

Stove Name ____________ Date ____________

Run # 1 Phase # ________ Operator ____________

Sample Time 1332

	CO_2	O_2	CO	N_2
Accumulative	13.0	19.2	—	
Net	13	6.2	—	

Note: Using portable Orsat

Sample Time 1355

	CO_2	O_2	CO	N_2
Accumulate	6.0	20.4	20.6	
Net	6.0	14.4	0.2	

Sample Time 1415

	CO_2	O_2	CO	N_2
Accumulate	4.8	20.0	20.2	
Net	4.8	15.2	0.2	

Sample Time 1430

	CO_2	O_2	CO	N_2
Accumulate	4.2	20.0	20.0	
Net	4.2	15.7	—	

Sample Time 1505

	CO_2	O_2	CO	N_2
Accumulate	3.0	20.4	20.6	
Net	3.0	17.4	0.2	

ORSAT DATA

Stove Name ____________ Date [illegible]

Run # ________ Phase # ________ Operator [illegible]

Sample Time [illegible]

	CO_2	O_2	CO	N_2
Accumulative	3.0	20.4	20.4	
Net	3.0	17.4	0	

Sample Time 1625

	CO_2	O_2	CO	N_2
Accumulate	3.0	20.6	20.8	
Net	3.0	17.6	0.2	

Sample Time ________

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Sample Time ________

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Sample Time ________

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Moisture Data

Stove Name ____________________ Date ____________

Run # __________ Phase # __________ Operator ____________

Time (24 H)	Temperature		Moisture Percent
	Wet Bulb	Dry Bulb	
1328	179	610	
1350	152	510	16
1410	160	930	16
~~1420~~ 1446	136	400	10
1516	110	390	~ 3
1519	120	300	6
1553	130	370	~~3~~ 8

pa 1 5

Operating Parameters

Run # 10 Date 8-25-81 Clock Time (24 H) 10:50 Operator SSN

Stove Name

Fuel: Initial Charge (lb) Remaining Coal Bed (lb) 2.5 PHASE 1

Test Charge pieces 28 lb; Kindling Several pieces 2.7 lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES Combustion Air	Combustion Chamber	Stove Surface	O_2 ~~Opacity~~ Meter	Catalyst Pre	Catalyst Post	NDIR CO %	CO_2 %	HC ppm	Opacity	(STACK DAMPER FULLY OPEN) Comments (Footnotes)
0	30.7											DOORS OPEN
5	29.5		911	500	17		810	1.0	13.5	150	10%	CLOSED DOORS @ 3 MIN - DAMPER OPEN
10	28.1		839	590	10.5		984	1.2	13.0	150	10%	
15	26.4		733	590	13.0		820	.6	11.0	100	10%	DAMPER to 1/2 @ 11:05
20	25.3		687	590	15.5		651	.41	7.5	50	18%	DAMPER to 1/4 open @ 11:12
25	24.4		657	550	17.5		626	.50	4.0	75	20%	
30	23.8		639	480	18.0	590	714	.4	2.5	60	20%	Secondary Air Control off
35	23.1		637	440	18.5		718	.32	2.5	45	20%	" " " ON
40	22.7		667	390	19.0	567	723	.24	2.0	35	20%	" " " Off
45	22.2		655	360	19.5		622	.20	1.8	30	20%	Secondary Air On
50	21.7		640	350	19.0	553	618	.30	2.5	35	20%	
55	21.2		646	330	20.0		594	.15	1.0	20	20%	
60	20.8		607	320	15.0		552	.95	7.0	150	20%	

Comment Number: ① DAMPER to 1/2 open @ 4 MIN

8316 5490 200.5 7932 6.27 ~~66.3~~ 68.3 900 [illegible]

206

pa. 2 5

Operating Parameters

Run # 10 Date 8-25-81 Clock Time (24 H) ______ Operator SM

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elapsed Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	~~Opacity~~ O_2 Meter	Catalyst Pre	Catalyst Post	CO %	CO_2 %	HC ppm		
65	20.3		608	300	15.5		566	.85	6.0	145	20%	opened DAMPERS to 1/2 open @ 11:55
											Change →	to Ph. II @ 68 min to 75 min
80	18.7		525	330	15.0	527	611	.85	7.0	180		
85	18.1		554	330	15.0		658	.95	7.0	200	20%	
90	17.8		538	310	15.0		621	.85	7.0	180	20%	open DAMPERS to 3/4 OPEN @ 12:21
95	17.4		549	300	15.0	520	627	.90	6.5	200	25%	
100	16.8		575	295	14.5		626	.90	6.0	230	20%	
105	16.3		569	295	15.0		647	.90	5.5	230	20%	
110	15.9		554	295	15.5	522	597	.85	6.0	225	20%	Excess Air off
115	15.4		565	280	15.5		578	.75	5.0	180	20%	
121	14.9		559	280	15.5		544	.80	5.5	200	25%	Excess Air ON
125	14.5		549	280	15.5		520	.80	5.5	200	20%	DAMPERS to 1 turn OPEN
130	14.2		552	275	15.75		536	.80	5.5	215	20%	
Comment Number:			~~6084~~ 6697	~~3270~~ 3570	~~162.25~~ 182.75		~~6565~~ 7131	~~9.35~~ 10.2	~~66.5~~ 72.5	[illegible] 2385		

pg. 3 5

Operating Parameters

Run # 10 Date 8/25/8 Clock Time (24 H) ______ Operator SSM

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES Combustion Air	Combustion Chamber	Stove Surface	~~Opacity~~ O₂ Meter	Catalyst Pre	Catalyst Post	NDIR CO %	NDIR CO₂ %	NDIR HC ppm	Opacity	Comments (Footnotes)
135	13.8		547	280	15.5		574	.80	5.0	210	20%	
140	13.2		543	275	15.5		535	.70	5.0	205	20%	
145	12.9		534	275	16.0		526	.75	5.0	200	20%	DAMPERS to 1½
150	12.5		525	255	16.5		565	.70	4.5	200	20%	
155	12.0		571	260	15.0		487	.60	6.0	190	20%	
160	11.5		612	275	15.5		520	.60	6.0	200	20%	
170	10.4		665	340	14.5		584	.45	10.0	160	25%	
175	9.6		789	400	13.5		673	.45	10.0	155	22%	DAMPERS to 1 turn OPEN @ 13:40
180	8.8		778	440	14.0		681	.45	9.0	135	20%	
185	8.2		792	450	14.5		657	.35	7.5	115	20%	CLOSED DAMPERS to 3/4 turn OPEN
190	7.9		620	450	15.0		704	.40	5.5	125	20%	
195	7.5		643	440	15.5		677	.45	5.0	125	20%	
200	7.1		677	400	16.5		610	.42	4.5	115	20%	
			829	4540	197.5		7193	7.12				

Comment Number:

208

pg. 4 of 5

Operating Parameters

Run # 10 Date 8-25-81 Clock Time (24 H) ______ Operator SEN
Stove Name ______
Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______
Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES Combustion Air	Combustion Chamber	Stove Surface	O_2 ~~Opacity~~ Meter	Catalyst Pre	Catalyst Post	NDIR CO %	NDIR CO_2 %	NDIR HC ppm	Opacity	Comments (Footnotes)
205	6.8		708	390	16.5		613	.40	5.0	105	20	CLOSED DAMPERS to 1/2 open @ 14:16
210	6.4		646	380	17.0	593	624	.42	4.5	110		
216	6.0		659	370	17.5		582	.35	3.0	105		CLOSED DAMPER to 1/4 OPEN @ 14:28
220	5.9		569	370	17.5		675	.40	3.0	110		
225	5.7		549	350	18.0		504	.43	3.0	100		
230	5.6		527	340	18.0	499	538	.43	2.7	90		
235	5.4		507	320	18.0		552	.41	2.5	85		
240	5.2		500	310	18.25		556	.40	2.5	80		
245	5.1		488	300	18.5		514	.40	2.5	80		open DAMPERS to 1/2 turn @ 14:55
250	5.0		515	300	18.0	~~479~~	540	.36	2.0	75		
260	4.6		443	280	18.0	x	384	.30	2.0	75		DAMPERS to 1 1/2 @ 15:08
265	4.3		502	300	18.5	*	373	.15	4.0	70		
270	3.9		570	350	18.0	*	395	.21	3.6	110		DAMPERS to 1 turn open @ 15:48

Comment Number: ① 13:13 — open DOORS & Poked Fire 6850

118 424 | 31.75 ~~5698~~ | 4.66 | 40.3 11.95

② LOW CAT. Temp Readings due to GROUNDED T.C. WIRES

10 readings

page 5 of 5

Operating Parameters

Run # 10 Date 8/25/81 Clock Time (24 H) ______ Operator SEV

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES			O_2			NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	~~Opacity~~ Meter	Catalyst Pre	Catalyst Post	CO %	CO_2 %	HC ppm		
275	3.7		567	380	17.5	530	459	.21	3.0	90	20	
280	3.4		571	370	18.0	*	356	.215	3.5	80	20	POST Reading Low do to GROUNDING TC
285	3.1		567	380	18.0	*	352	.20	2.5	70	20	〃
290	3.0		551	385	17.5		576	.22	3.0	60	20	
295	2.8		490	380	17.75	473	558	.24	3.0	55	20	DAMPERS to 1 1/8 @ 15:46
300	2.7		480	360	17.0		534	.27	3.0	50	20	DAMPERS to 1 1/2 @ 15:51
304	2.6		-	350								End of Burn
			3[illegible]26	2605	105.75		2127	1.355	18	405		
		Final T {	4947	[illegible]	[illegible]		[illegible]	20A1	[illegible]	3475		
			4_	44	42		38	42	43	42		
							[illegible]					

Comment Number: .5 lb (Screw Driver)

6021

210<

page 1 of 2

(START) SU!! phase 2 ≈17.5 lbs

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ 1.84 Date 8-25-81 Train Operators DLP
Run # 10 Phase # 1 Clock Time (24 H) 1050 *
Sample Box # NApp #1 Stack Dimensions 8" ∅
Probe Length 6' Barometric Pressure 29.80" Hg
Probe Material S. STeel Nozzle Diameter 0.625" ∅

SLOW START due TO DEQ VISITORS

leak check <.02 CFM @ 225 m juice 18 lbs vac

C_p = 0.803

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			POST CATALYST Chamber Comments		
			Calc.	Act.		T in	T out			Imp.	WB	DB	#7	#8	% m
0	484.742			.35	256				280				357	1630	est 20
1				.35	362	82	81	0	279				648	1226	
2.5				.35	483				278	73			676	1210	
3.5		.012		.35	532										
5	486.39	.008	.46	.46	515	83	80	0	280	67			[illegible]		
7		.010	.57	.57	490			1					821		
9	488.11	.005	.29	.29	470										
12	489.12	.004	.23	.25	414	84	83	0	290	63			835	816	
15	490.00	.004	.27	.28	355	84	83	0	295	62			736		
20	491.52	.005	.33	.35	314	84	83	1	298	63			601		
25	493.34	.004	.33	.35	266	84	83	1	298	63			636		est 15
30	495.14	.005	.44	.45	244	86	87	1.5	302	62			778	601	
35	496.95	.004		.40	208	87	87	1.5	289	68			720		38(?)
40	498.12	.004	.23	.25	201	87	88	10	263	68			724		38
50	501.62	.005	.29	.30	206	88	89	17	274	65			622		29
		0.88806 Σ√ΔP		5.35		1693									

pag 2 2

Oregon Method 7 Sampling Data Sheet

Stove Name ____ H@ ____ Date 8-25-81 Train Operators ____

Run # 10 (cont) Phase # 1 Clock Time (24 H) ____

Sample Box # ____ Stack Dimensions ____ s/s 1159 to change trains

Probe Length ____ Barometric Pressure ____

Probe Material ____ Nozzle Diameter ____

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments		
			Calc.	Act.		T in	T out			Imp.	WB	DB	#7	#8	%M
* 60	504.76	.005	.35	.20	207	88	89	22	293	66			558	613	est 30
69	506.819														
		0:16816		5.55	5523		15:0								
		17		15	16										

* filter clogging - will shorten phase 1 to ~~[illegible]~~ 20.0 lbs (vs 17.5)

pas. 1 .. 2

Oregon Method 7 Sampling Data Sheet

leak chk <.002CFM @ 15ʺHg

Stop ~2.3 lbs

Stove Name ______ H@ 1.84 Date 8-25-81 Train Operators DCP
Run # 10 Phase # 2 Clock Time (24 H) 1204-1554
Sample Box # Nopp#2 Stack Dimensions 8"Ø
Probe Length 3' Barometric Pressure 29.80"Hg
Probe Materials. Steel Nozzle Diameter 0.502"Ø Cp = 0.824

s/s change traverse 1159 & 1204 hrs

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments		
			Calc.	Act.		T in	T out			Imp.	WB	DB	#7	#8	%M
69Ø	506.819	.004	.15	.17	160	89	88	0	205				608	540	25
80	509.75	.005	.19	.20	224	90	89	0	251	61			652		
90	512.38	.005	.19	.20	224	90	91	0	267	64			624		
100	516.05	.005	.19	.20	236	92	91	0	276	65			637	567	
11.0	517.71	.006	.22	.23	231	93	91	0	284	65			610		
120	520.72	.005	.15	.17	228	92	93	0	283	66			559	555	29
130	523.	.005	.15	.17	246	92	93	0	288	69			598		
144	526.45	.005	.15	.17	264	92	94	0	287	69			528		38(?)
157	529.17	.005	.15	.17	303	92	94	0	287	72			522		
172	533.20	.005	.11	.14	332	93	94	0	288	72			671		
186	535.81	.005	.11	.14	255	93	95	0	290	76			690		
206	539.99	.005	.11	.14	237	93	95	0	290	80			556	652	
223	543.33	.005	.11	.14	191	94	96	0	290	76			534		
238	546.81	.005	.11	.14	161	93	95	0	291	74			570		
252	549.56	.004		.12	180	93	96	0	289	76			396		

pag 1. 2

step 2.5 IWS

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ ______ Date 8-25-81 Train Operators ______

Run # 10 (cm7) Phase # 2 (cm7) Clock Time (24 H) -1554

Sample Box # ______ Stack Dimensions ______

Probe Length ______ Barometric Pressure ______

Probe Material ______ Nozzle Diameter ______

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments		
			Calc.	Act.		T in	T out			Imp.	WB	DB	#7	#8	EM
265	552.11	.004		.12	281	92	95	0	289	76			405	573	8
282	555.41	.004		.12	236	93	96	0	291	80			346		
299	558.701														

Oregon Method 7 Sample Recovery Data Sheet

Stove Name ________ Date 8-25-81

Run # 1 Phase # I Clock Times (24 H) ________

Box # 1

CONDENSED WATER DETERMINATION

Impinger:	#1	#2	#3	#4	Total Condensate	ml
Final Weight	598.0	541.2	428.8	748.2		#1-160
[illegible] Initial Weight	539.8	536.9	427.9	742.0		#2-102
Net Weight	58.2	4.3	0.9	6.2	64.6	
		63.4				

FILTER IDENTIFICATIONS

Front Filter-First Filter # 077 Back Filter-First Filter # 225

Front Filter-Second Filter # ____ Back Filter-Second Filter # ____

WASH IDENTIFICATION

Probe/Front Filter Wash ________

Impinger Wash ________

Blank ________

CREOSOTE COUPONS

Plate Location TRANSMISSOMETER Plate Location SAMPLE LOCATION

Plate Identification 10 A Plate Identification 10 B

Tare

	Date	~~Mg~~ g	Date	Mg
		70.8709		56.9868
Final				
		70.8728		56.9970
				.0102
Net		.0019		
		1.9mg		10.2 mg

Oregon Method 7 Sample Recovery Data Sheet

Stove Name ______ Date 8/25/81

Run # 10 Phase # 2 Clock Times (24 H) ______

Box # 2

CONDENSED WATER DETERMINATION

Impinger:	#1	#2	#3	#4	Total Condensate
Final Weight	585.0	532.9	430.4	771.8	
Initial Weight	529.9	529.1	429.5	760.0	
Net Weight	55.1	3.8	0.9	11.8	

$\underbrace{55.1 \quad 3.8 \quad 0.9}_{59.8}$

71.6 total

#1 - 150

#2 - 90ml

FILTER IDENTIFICATIONS

Front Filter-First Filter # 076 Back Filter-First Filter # 226

Front Filter-Second Filter # ____ Back Filter-Second Filter # ____

WASH IDENTIFICATION

Probe/Front Filter Wash ______

Impinger Wash ______

Blank ______

CREOSOTE COUPONS

Plate Location TOP Plate Location Bottom

Plate Identification 11A Plate Identification 11B

Tare

Date	~~Mg~~ g	Date	~~Mg~~ g
____	____	____	____
____	____	____	____
____	69.6231	____	70.2572

Final

	Date	~~Mg~~ g	Date	~~Mg~~ g
	____	69.6476	____	70.3110
	____	____	____	____
Net	____	.0245 24.5 mg	____	.0538 53.8 mg

Laboratory Total Particulate Calculations

Stove Name PSO48 Date of Sampling 8/25/81
Run # 10 Phase # ~~2~~ 1 Date of Analysis ______
Box # ~~2~~ 1 Analyst ______

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 183 (ml) of Acetone
Final 69.2163 (mg) - Tare 69.1280 (mg) net 88.3 mg
- Blank ((.009 mg/ml)(183 ml) = 1.65 mg) = 86.65 mg

II. Filter catch(es). F#077 B#225
Front filter Final 0.5273 (mg) - Tare 0.4692 (mg) 0.0581
+ Back-up filter Final 0.4273 (mg) - Tare 0.2081 (mg) = ~~0.1445~~ mg .2192
~~Total 0.2026 g~~

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2CL2 85 ml
Final 72.8842 (mg) - Tare 72.6598 (mg) net 224.4 mg
- Blank((.0025 mg/ml)(85 ml) = .2125 mg) = 224.19 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.

Final 73.1027 (mg) - Tare 72.9766 (mg) net 126.1 mg
- Blank ((.006 mg/ml)(268 ml total
- 63.4 ml condensed = 204.6 ml) = 1.2276 mg) = 124.87 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Acetone 233 ml
Final 74.0526 (mg) - Tare 73.8683 (mg) net 184.3 mg
- Blank ((.009 mg/ml)(233 ml) = 2.10 mg) = 182.2 mg

VI. Other particulate catches. = ______ mg

VII. Total particulate = I+II+III+IV+V+VI = 895.21 mg

Blanks

Acetone Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ = ______ mg/ml

Methylene chloride Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Water Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Other Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Laboratory Total Particulate Calculations

Stove Name PS048
Date of Sampling 8/25/81.
Run # 10
Phase # 7
Date of Analysis
Box # 1
Analyst

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 136 (ml) of Aceton
Final 71.4824 (mg) - Tare 71.2894 (mg) net 193.0 mg
- Blank ((.009 mg/ml)(136 ml) = 1.224 mg) = 191.776 mg

II. Filter catch(es). F# 076 B# 226
Front filter Final 0.5464 (mg) - Tare 0.4682 (mg) 0.0782
+ Back-up filter Final 0.3543 (mg) - Tare 0.2098 (mg) = 0.1445 mg
Total 0.2227 g

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2 CL2 85 ml
Final 73.4662 (mg) - Tare 72.9791 (mg) net 487.1 mg
- Blank((.0025 mg/ml)(85 ml) = .2125 mg) = 486.88 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.

Final 71.0711 (mg) - Tare 70.8299 (mg) net 241.2 mg
- Blank ((.006 mg/ml)(266 ml total
- 59.8 ml condensed = 206.2 ml) = 1.237 mg) = 239.96 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used ACETONE 342 ml
Final 74.5321 (mg) - Tare 74.0627 (mg) net 469.4 mg
- Blank ((.009 mg/ml)(342 ml) = 3.08 mg) = 466.32 mg

VI. Other particulate catches. = ______ mg

VII. Total particulate = I+II+III+IV+V+VI = 1607.64 mg

Blanks

Acetone Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Methylene chloride Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Water Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Other Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	20
	25	25	25	20
	20	25	25	20
	25	20	25	20
	20	20	25	30
	40	35	35	30
31'	30	30	35	20
	15	20	20	20
	15	20	20	20
	20	20	25	25
	30	30	25	20
	15	15	10	15
	15	15	10	10
	15	20	20	15
	15	15	15	15
	15	20	20	20
	20	20	15	20
	20	20	20	20
	20	20	25	20
	20	25	30	30
	35	35	35	30
	30	30	25	25
	25	25	25	20
	25	25	30	25
	25	25	20	15
	20	20	20	20
	20	25	20	20
	15	15	15	15
	15	15	20	20

Time	0	1/4	1/2	3/4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	25	25	25	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
150'	25	25	25	20
	20	20	25	25
	25	20	25	25
	20	20	20	20
	20	15	20	20
	20	20	20	20
	20	15	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	15	15	15	20
	20	20	15	20
	20	20	20	20
	20	20	20	20
150	20	20	20	20
	20	20	20	20

Stove Name

Date [illegible]

Clock Times (24 H) [illegible]

Run # 10

Phase # 1

Observer [illegible]

Distance to Source 0-20'

Direction to Source SE

Wind Direction S

Wind Velocity 0-5

Cloud Cover 50%

Plume Background [illegible]

Stability [illegible]

Relative Humidity

Type Contaminant woodsmoke

Color white

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

Units No.

Minutes of Observation

some [illegible]

218<

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
[illegible]	30	30	35	40
[illegible]	40	35	35	35
	35	35	40	35
	35	35	30	30
	30	30	30	25
	30	30	30	30
	30	30	30	30
	30	30	30	30
	30	30	30	30
	30	30	30	30

Time	0	1/4	1/2	3/4

Stove Name ____________
Date [illegible]
Clock Times (24 H) [illegible]
Run # ~~2~~ 10
Phase # 2
Observer [illegible]
Distance to Source 30'
Direction to Source SE
Wind Direction S - variable
Wind Velocity 0-5
Cloud Cover 50%
Plume Background trees
Stability moderate
Relative Humidity ____________
Type Contaminant wood smoke
Color white

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

____ Units No. ____________

Minutes of Observation ____________

Bacharach Smoke Spot

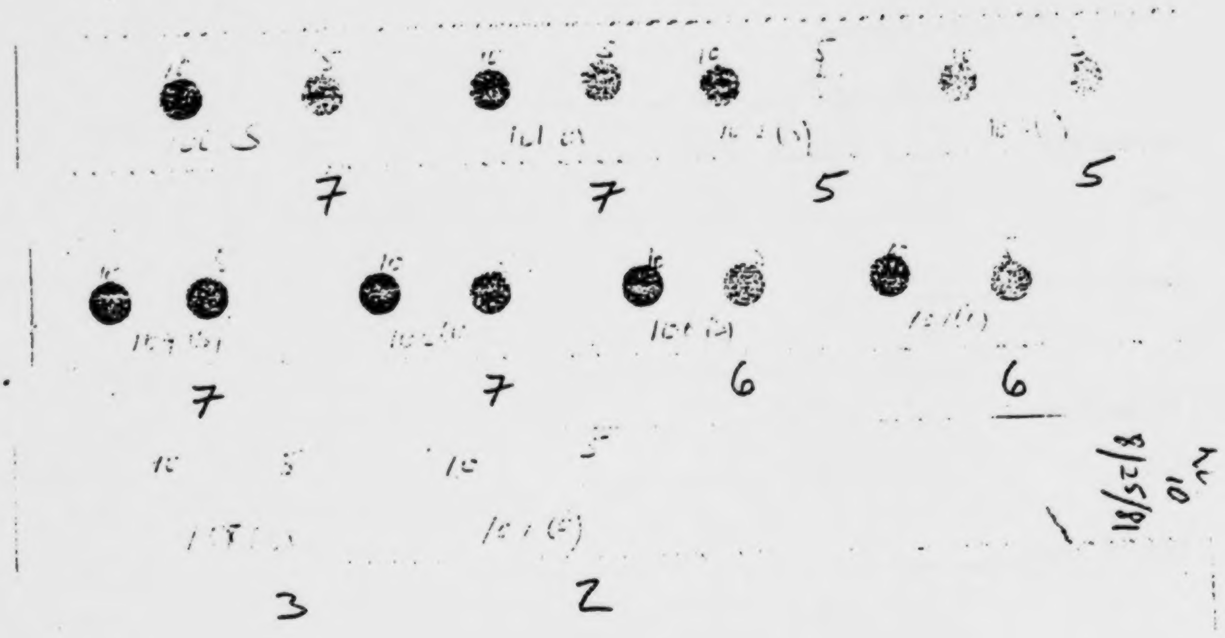
Run 10 Date [illegible] Operator SC

Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value	Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value
100	1151	S	210	7					
101	1200	O	150	7					
102	1257	S	242	5					
103	1259	O	115	5					
104	1336	S	315	7					
105	1339	O	200	7					
106	1412	S	235	6					
107	1415	O	170	6					
108	1459	S	170	3					
109	1502	O	125	2					

Comments:

Sample Temperature is Stack Temp.

Run 10


7
7
5
5
7
7
6
6
3
2
8/25/81
10 hr

ORSAT DATA

Stove Name ____________ Date 8/25/81

Run # 16 Phase # 2 Operator JC

Sample Time 1426

	CO_2	O_2	CO	N_2
Accumulative	5.4	20.2	20.6	___
Net	5.4	14.8	0.4	___

Sample Time ~1522

	CO_2	O_2	CO	N_2
Accumulate	6.5	20.2	20.2	___
Net	6.5	13.7	0	___

Sample Time 1540

	CO_2	O_2	CO	N_2
Accumulate	4.8	20.4	20.4	___
Net	4.8	15.6	0	___

Sample Time ____________

	CO_2	O_2	CO	N_2
Accumulate	___	___	___	___
Net	___	___	___	___

Sample Time ____________

	CO_2	O_2	CO	N_2
Accumulate	___	___	___	___
Net	___	___	___	___

ORSAT DATA

Stove Name -

Date 7 25 81

Run # 10

Phase # 2

Operator Sc

Sample Time 1137

	CO_2	O_2	CO	N_2
Accumulative	6.2	19.2	20.2	—
Net	6.6	13	1.0	—

Sample Time ~~1217~~ 1223

	CO_2	O_2	CO	N_2
Accumulate	5.8	19.8	20.6	—
Net	5.8	14	0.8	—

Sample Time 1246

	CO_2	O_2	CO	N_2
Accumulate	4.4	20.2	20.8	—
Net	4.4	15.8	0.6	—

Sample Time 1318

	CO_2	O_2	CO	N_2
Accumulate	4.6	20.0	20.6	—
Net	4.6	15.4	0.6	—

Sample Time [illegible]

	CO_2	O_2	CO	N_2
Accumulate	7.7	19.8	20.2	—
Net	7.7	12.1	0.4	—

Moisture Data

Stove Name ______ Date ______

Run # ______ Phase # ______ Operator ______

Time (24 H)	Temperature Wet Bulb	Temperature Dry Bulb	Moisture Percent
1124	170	290	38%
1132	160	290	29%
1209	200	310	—
1214	170	300	4.1%
1242	160	310	2.9%
1314	170	320	38%
1515	115	250	6%

* Changed to a different wet bulb thermometer.
(Weston dial thermometer, model # 4200)

Comment: The first six readings are ~~exper~~ suspected to be in error. The wet bulb thermometer was
224< giving ~~erratic~~ ~~erroratic~~ results.

Wood Moisture

Date 8·25-81 Test Run # 10

Operator JC

Meter Measurement

FUEL	A	B	C	D	E	F	G	H	AVE	
1 88	13	20	20	13	22	23	22	22	19.4	
2 89	16	~~22~~ 22	21	16	27	26	26	25	22.4	
3 90	15	20	20	18	30	30	30	30	24.1	
4 91	15	21	21	15	19	24	22	18	19.4	
5 92	23	23	23	24	21	22	22	19	22.1	
6 93	13	21	21	14	19	23	23	17	18.9	
7. 94	15	20	19	14	22	23	23	23	19.9	
8										
9									20.4	uncorr.
10										
11										
12										
Kindling										

Total Mass ______

Percent Moisture 22.4 (dry basis, corrected)

Total Mass (Dry Basis) ______

Page 1 of 1

Operating Parameters

Run # 11 Date 8-26-81 Clock Time (24 H) 10:57 Operator

Stove Name

Fuel: Initial Charge (lb) Remaining Coal Bed (lb) 2.1 (lb)

Test Charge 6 pieces 24.9 lb; Kindling Several pieces 2.8 lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	~~Opacity~~ O_2 Meter	Catalyst Pre	Catalyst Post	CO %	CO_2 %	HC ppm		
0	27.7											DOORS CLOSED @ 11:00 DAMPERS OPEN
5	25.2		1153	500	18.0		1120	.32	13.5	20	0	DAMPER to 1 turn OPEN @ 11:02
10	25.0		770	550	11.0	733	1036	.75	12.0	60	5%	DAMPER to 1/2 @ 11:07
15	23.9		659	540	13.0		970	.65	10.0	110	10%	
20	23.0		668	540	13.5		957	.65	10.0	110	10%	
25	22.1		663	520	13.0	640	965	.90	9.0	165	15%	
30	21.6		607	480	14.0		962	.90	8.0	180	18%	
37	20.5		606	410	15.0		942	.85	7.0	160	18%	
40	20.0		508	400	15.25	517	921	.85	7.0	165	15%	
45	19.5		507	370	15.50		856	.80	5.5	125	15%	OPENED DAMPERS to 3/4 turn open @ 11:43
50	19.1		520	350	15.5		825	.75	6.0	150	20%	
55	18.5		524	340	16.0	520	930	.75	5.5	150	15%	
60	17.9		465	330	16.0		863	.70	5.0	135	15%	OPEN DAMPERS to 1 turn open @ 11:58

Comment Number: 8.0 on @ 11:00

page 2 of 4

Operating Parameters

Run # 11 Date 8/26/81 Clock Time (24 H) ________ Operator [illegible]

Stove Name ________

Fuel: Initial Charge (lb) ________ Remaining Coal Bed (lb) ________

Test Charge ________ pieces ________ lb; Kindling ________ pieces ________ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES			O2			NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	~~Opacity~~ Meter	Catalyst Pre	Catalyst Post	CO %	CO_2 %	HC ppm		
65	17.1		465	320	16.0	465	⊛ 527	.70	5.0	150	12%	Removed T.C. wire and Re-twisted END
70	16.0		512	310	16.5	⊛	850	.65	4.5	140	10%	
75	15.8		504	300	16.5		825	.60	4.5	130	10%	opened DAMPERS to 1½ open @ 1213
80	15.6		512	300	16.0		848	.70	5.0	160	15%	
85	14.9		486	300	16.25		859	.65	5.0	160	10%	open DAMPERS to 2 turns open @ 1224
90	14.7		553	360	13.5	580	850	.50	9.0	130	10%	DAMPERS to 1½ OPEN @ 1229
95	14.2		830	420	10.5		⊛ 616	.45	13.0	80	10%	CLOSED DAMPERS to 1¼ @ 1234
105	12.1		644	540	13.5	637	747	.48	9.0	100	10%	
110	11.1		620	540	14.5		⊛ 501	.45	7.0	110	10%	CLOSED DAMPER to 1 turn OPEN @ 1251
115	10.3		661	500	13.0		872	.60	9.0	160	10%	
120	9.5		627	490	13.5		898	.65	8.0	160	10%	CLOSED DAMPERS to ¾ open @ 1301
125	9.1		636	470	14.0	608	894	.70	9.0	160	15%	
130	8.6		624		14.5		893	.70	7.0	140	15%	

⊛ CAT. Temp of 527 @ 65 min. is due to improperly installed T.C.

Comment Number:

7674. 4650 156.25 [illegible] 8536 7.63 75 1710

Changed Front Filter on SAMPLE TRAIN

228^

page 3 of 4

Operating Parameters

Run # 11 Date 8-26-81 Clock Time (24 H) ______ Operator [illegible]

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elapsed Time Minutes	Fuel Weight lbs	TEMPERATURES Combustion Air	Combustion Chamber	Stove Surface	~~Opacity~~ O2 Meter	Catalyst Pre	Catalyst Post	NDIR CO %	NDIR CO_2 %	NDIR HC ppm	Opacity	Comments (Footnotes)
135	8.3		583	450	15.0		817	.6	6.5	120	15%	
140	7.9		571	410	15.5	533	781	.65	6.0	120	10%	
145	7.7		551	390	15.5		752	.70	6.0	125	10%	
150	7.4		548	380	15.25		762	.70	6.0	140	15%	
155	7.0		519	360	15.0	498	777	.80	7.0	165	15%	
160	6.9		506	350	15.25		800	.75	6.0	150	10%	
165	6.6		515	340	15.25		788	.75	6.0	155	10%	
170	6.2		503	330	15.5		786	.70	6.0	160	10%	
175	5.8		502	330	15.75		801	.75	5.5	170	15%	
180	5.6		500	320	15.50		818	.75	6.0	165	15%	
185	5.3		485	320	15.75		830	.72	5.0	170	18%	opened damp. to 1 turn open @ 1403
190	4.9		425	316	16.0		846	.75	5.0	260	25%	opened damper to 1 1/2 turns
195	4.5		455	310	16.0		707	.45	5.0	150	15%	

Comment Number: 1422 ~JACK PANICS and POKES FIRE

6.43 4600 ~201.25 1031 1006 2.07 76

2

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Operating Parameters

Run # 11 Date 8/24/81 Clock Time (24 H) ______ Operator [illegible]
Stove Name ______
Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______
Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES Combustion Air	Combustion Chamber	Stove Surface	O_2 ~~Opacity~~ Meter	Catalyst Pre	Catalyst Post	NDIR CO %	NDIR CO_2 %	NDIR HC ppm	Opacity	Comments (Footnotes)
205	3.7		900	340	12		660	.30	12	60	10%	
210	3.1		1120	480	12.5		787	.29	13	80	15%	1429 – DAMPER 3/4 OPEN
215	2.8		625	525	14.0		833	.42	7.5	120	15%	
221	2.3		565	510	14.5		750	.46	7.5	130	15%	
225	2.1		562	480	14.5		748	.48	7.0	140	15%	END@ 1444
	[illegible]		3112	2235	61.5		3778	1.95	[illegible]	[illegible]	[illegible]	
	Totals		[illegible]	[illegible]	[illegible]	5731	33176	[illegible]	[illegible]	500	[illegible]	
	# readings		43	42	4[illegible]	1[illegible]	4[illegible]	43				
	Average		511	46	14.7	573	441	.35	7.36	137	13	

Comment Number:

230<

Oregon Method 7 Sampling Data Sheet

* scan progress this page due to TRANS. [illegible] questions by DCP

Stove Name ______ H@ 1.84 Date 8-26-81 Train Operators DLP
Run # 11 Phase # N.A. Clock Time (24 H)* 1057-1443
Sample Box # Nopgl Stack Dimensions 8" ø
Probe Length 6' Barometric Pressure 29.84" Hg
Probe Material Steel Nozzle Diameter 0.502" ø
Cp = .803

medium % M fuel
<.02 CFM @ 20 in vac leak check
2.8 lbs kindling

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Post Catalyst Chamber Comments		
			Calc.	Act.		T in	T out			Imp.	WB	DB	#7	#8	% m
0	558.777			.15	233	75	74	0	261	63			290	427	est 25
1.5				.20	341								506		
2				.20	430								697.		
2.5				.20	494	75	74	0	266	63			864		
3.5		.016		.20	621								1063	1442	
6	560.21	.017		.20	622	75	74		274	61			1179		
7	560.74	.018		.40	559			.5					1095		
9		.017		.45	507	75	74	.5	285	56			1072		
11	562.24	.018	.43	.45	459			2					1039	795	
15	563.72	.018	.53	.53	374	79	77	2	297	57			978		19
20	565.89	.016	.47	.50	327	81	79	2	289	63			966		
25	567.65	.016	.53	.50	306	82	81	2	261	68			954		
30	569.66	.009	.30	.40	312	83	84	2.5	267	64			962		est 17
35	571.27	.008	.27	.37	307	85	85	3.5	282	62			950	606	
40	572.76	.006	.20	.23	295	85	86	4	291	63			929		

1.3045 5 6181 1583
JAP

pa; 2

Oregon Method 7 Sampling Data Sheet

Stove Name ____ H@ ____ Date 8-26-81 Train Operators ____
Run # 11 (cm) Phase # N.A. Clock Time (24 H) -1443
Sample Box # ____ Stack Dimensions ____
Probe Length ____ Barometric Pressure ____
Probe Material ____ Nozzle Diameter ____

step @ ~2.10 lbs

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments		
			Calc.	Act.		T in	T out			Imp.	WB	DB	#7	#9	% M
45	574.	.008	.27	.30	279	86	86	7	299	65			862	509	est 17
50	575.24	.066	.20	~~.30~~ .26	279	87	87	14	283	64			875		
60		.005	.18	.22	296	89	87	12	300	64			871		14
70	580.33	.005		.18	307	87	88	13	307	67			855		
80	582.56	.005		.18	309	88	90	14	283	73			840		
90	584.	.005	.18	.20	348	87	89	16	300	68			855		est 12
* 100	586.558	.005	.18	.20	395	89	86	5.5		70			613		18
110	589.12	.005		.20	360	90	91	5.5	225	67			815	658	
134	594.81	.005	.19	.20	261	92	93	6.5	300	71			812		
155	600.65	.004	.15	.20	221	95	93	6	215	70			815	504	
170	604.78	.004	.16	.20	240	93	94	6	267	63			792		
186	608.57	.003	.12	.17	253	94	95	7	288	71			830		
198	611.10	.003	.13	.17	280	95	93	8	276	72			675	458	7
213	614.61	.003		.17	285	93	94	8.5	283	74			830		
223	617.998														

* changed filters 1237 – 1240 hrs

2.1008 2.85 5/3 4113 2531

Oregon Method 7 Sample Recovery Data Sheet

Stove Name ______ ____________________ Date 8/26/8!

Run # 11 Phase # ________ Clock Times (24 H) ________

Box # 1

CONDENSED WATER DETERMINATION

1 - 190
.104

Impinger:	#1	#2	#3	#4	Total Condensate
Final Weight	626.1	545.3	429.8	762.5	
Initial Weight	529.6	538.4	428.2	748.0	
Net Weight	.96.5	6.9	1.6	14.5	Total 119.5

105

FILTER IDENTIFICATIONS

Front Filter-First Filter # C75 Back Filter-First Filter # 227

Front Filter-Second Filter # 061 Back Filter-Second Filter # ____

WASH IDENTIFICATION

Probe/Front Filter Wash ____________

Impinger Wash ____________

Blank ____________

CREOSOTE COUPONS

Plate Location TOP Plate Location Bottom

Plate Identification 12A Plate Identification 12B

	Date	~~Mg~~ g	Date	~~Mg~~
Tare				
	____	____	____	____
	____	____	____	____
	____	66.3202	____	71.2186
Final				
	____	____	____	____
	____	66.3554	____	71.2 27
Net	____	.0352	____	.0341
		35.2 mg		34.1 mg

232<

Laboratory Total Particulate Calculations

Stove Name ______________ Date of Sampling 8/26/81
Run # 11 Phase # —— Date of Analysis 8/27/81
Box # 1 Analyst [illegible]

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 230 (ml) of Acetone
Final 72.9142 (mg) - Tare 72.6265 (mg) net 287.7 mg
- Blank ((.009 mg/ml)(230 ml) = 2.07 mg) = 285.63 mg

II. Filter catch(es). F# ~~075~~ 061 B# 227
Front filter → 061 Final 0.5349 (mg) - Tare 0.4664 (mg) = 68.5 mg — FRONT
+ Back-up filter Final 0.5410 (mg) - Tare 0.4664 (mg) = 74.6 mg
Back → = 227 0.5342 g 0.2176 g 316.6 mg — Back
459.7 mg

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2CL2 85 ml
Final 72.9597 (mg) - Tare 72.6455 (mg) net 314.2 mg
- Blank((.0025 mg/ml)(85 ml) = .2125 mg) = 314.0 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.

Final 72.9042 (mg) - Tare 72.5512 (mg) net 353.0 mg
- Blank ((.006 mg/ml)(300 ml total
- 105 ml condensed = 195 ml) = 1.17 mg) = 351.83 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Acetone 262 ml
Final [illegible] (mg) - Tare 72.3372 (mg) net 768.6 mg
- Blank ((.009 mg/ml)(262 ml) = 2.358 mg) = 766.24 mg

VI. Other particulate catches. = ________ mg

VII. Total particulate = I+II+III+IV+V+VI = 2177.40 mg

Blanks

Acetone Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Methylene chloride Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Water Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Other Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
[illegible]	[illegible]		[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	15	20	[illegible]
	20	20	15	15
	10	10	10	10
	10	5	5	5
	5	5	0	0
	0	0	5	0
	10	10	10	10
	5	5	10	20

Time	0	1/4	1/2	3/4

Stove Name ____
Date [illegible]
Clock Times (24 H) [illegible]
Run # [illegible]
Phase # ____
Observer [illegible]
Distance to Source [illegible]
Direction to Source SE
Wind Direction [illegible]
Wind Velocity 0-5
Cloud Cover 0%
Plume Background [illegible]
Stability [illegible]
Relative Humidity ____
Type Contaminant [illegible]
Color [illegible]

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

____ Units No. ____

Minutes of Observation ____

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
[illegible]	[illegible]		[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	20	[illegible]	25	[illegible]
	[illegible]	20	[illegible]	25
	25	[illegible]	[illegible]	30
	30	[illegible]	[illegible]	30
	30	30	30	30
	25	25	30	30
	30	30	30	25
	25	25	25	30

Time	0	1/4	1/2	3/4
[illegible]		[illegible]	[illegible]	[illegible]
	5	[illegible]	[illegible]	5
	15	15	20	20
	20	20	20	[illegible]
	20	20	20	20
	15	15	15	15
	15	15	15	15
	15	15	15	10
	15	15	15	15
	15	15	15	15

Stove Name ______ ______

Date [illegible]

Clock Times (24 H) [illegible]

Run # 1

Phase # ______

Observer [illegible]

Distance to Source [illegible]

Direction to Source SE

Wind Direction [illegible]

Wind Velocity 0-5

Cloud Cover 100%

Plume Background [illegible]

Stability [illegible]

Relative Humidity ______

Type Contaminant [illegible]

Color ______

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

______ Units No. ______

Minutes of Observation ______

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	15
	[illegible]	15	[illegible]	15
	15	15	15	15
	15	15	15	20
	[illegible]	[illegible]	20	20
	[illegible]	[illegible]	20	15
	[illegible]	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15
	15	15	15	15

Time	0	1/4	1/2	3/4
[illegible]	[illegible]			
	[illegible]			
	[illegible]		[illegible]	
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]			

Stove Name ______ ______
Date ______
Clock Times (24 H) ______
Run # [illegible]
Phase # ______
Observer [illegible]
Distance to Source [illegible]
Direction to Source [illegible]
Wind Direction [illegible]
Wind Velocity 0-5
Cloud Cover 30 %
Plume Background [illegible]
Stability [illegible]
Relative Humidity ______
Type Contaminant [illegible]
Color [illegible]

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

____ Units No. ______

Minutes of Observation ______

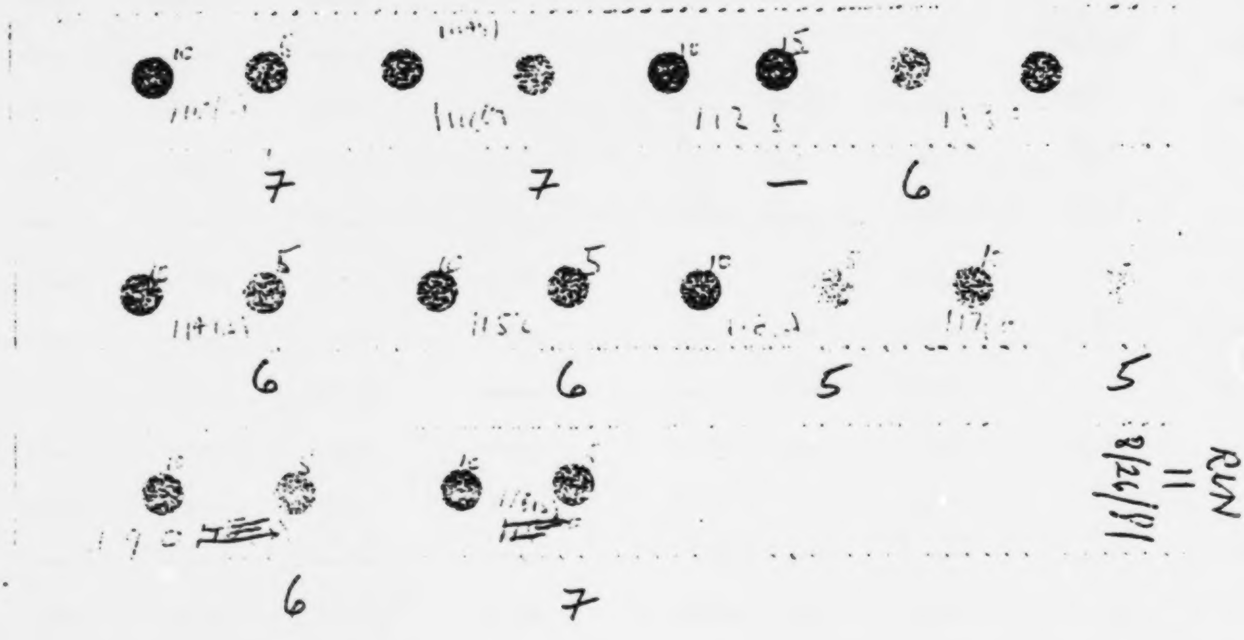
Bacharach Smoke Spot

Run ______________________ Date [illegible] Operator [illegible]

Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value	Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value
[illegible]		[illegible]	[illegible]	7					
111	[illegible]	[illegible]	[illegible]	7					
112	120[illegible]	S	298	—					
113	1213	0	~~[illegible]~~	6					
114	1245	S	384	6					
115	1250	0		6					
116	1338 ~~[illegible]~~	S	234	5					
117	1343	0	150	5					
118	[illegible]	S	270	7					
119	1402	0		6					

Comments: ____

Run 11


10
5
10
15
7
7
—
6
10
5
10
5
10
6
6
5
5
10
10
6
7
RUN
11
8/26/81

238<

ORSAT DATA

Stove Name ______

Date [illegible]

Run # 1

Phase # ______

Operator [illegible]

Sample Time 1113

	CO_2	O_2	CO	N_2
Accumulative	7.4	18.6	20.0	___
Net	7.4	11.2	0.4	___

Sample Time 1124

	CO_2	O_2	CO	N_2
Accumulate	7.0	20.0	20.8	___
Net	7.0	13.0	0.8	___

Sample Time 1157

	CO_2	O_2	CO	N_2
Accumulate	5.4	20.0	20.5	___
Net	5.4	14.6	0.5	___

Sample Time 1237

	CO_2	O_2	CO	N_2
Accumulate	11.4	19.8	20.2	___
Net	11.4	8.4	0.4	___

Sample Time ~~1305~~ 1310

	CO_2	O_2	CO	N_2
Accumulate	6.8	20.3	20.6	___
Net	6.8	13.5	0.3	___

ORSAT DATA

Stove Name ______

Date [illegible]

Run # 11

Phase # ______

Operator [illegible]

Sample Time 1353

	CO_2	O_2	CO	N_2
Accumulative	5.0	19.8	20.2	
Net	5.0	14.8	0.4	

Sample Time 1418

	CO_2	O_2	CO	N_2
Accumulate	5.2	20.4	20.6	
Net	5.2	15.2	0.2	

Sample Time 1444

	CO_2	O_2	CO	N_2
Accumulate	5.9	19.8	20.0	
Net	5.9	13.9	0.2	

Sample Time ______

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Sample Time ______

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Moisture Data

Stove Name

Date 7/[illegible]/81

Run # 11

Phase # [illegible]

Operator [illegible]

Time (24 H)	Temperature		Moisture Percent
	Wet Bulb	Dry Bulb	
1112	150	380	17
1154	140	350	14
1234	150	400	18
1307	135	360	13
1409	120	280	7
~~[illegible]~~			

2.3

242

Page 1 of 1

Operating Parameters

Run # 12 Date 8/27/8 Clock Time (24 H) 10:20 Operator SSM
Stove Name
Fuel: Initial Charge (lb) Remaining Coal Bed (lb) 1.3
Test Charge 7 pieces 28.8 lb; Kindling Several pieces 2.0 lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES			O_2 ~~Opacity~~ Meter	Consumer ~~Catalyst~~		NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface		Pre	Post	CO %	CO_2 %	HC ppm		
0	30.8											CLOSED DOORS @ 1023 DAMPERS FULL OPEN
5	28.5		1105	460	13.5		499	.65	8.0	90	5%	DAMPER → 1 turn open 10:26
10	27.3		1116	500	14.0		446	1.4	7.5	200	10%	
15	25.8		1325	500	14.0		487	1.4	7.5	220	10%	DAMPER → 1/2 @ 1036
20	24.8		795	480	16.0		357	1.0	5.0	185	20%	
26	23.5		788	420	16.5			1.0	4.5	195	30%	Open Stove to @ 1044 Remove Wood from T.C
30	22.8		587	420	16.5		326	1.0	4.75	220	30%	
35	22.0		614	410	17.0		310	1.0	4.0	220	35%	
40	21.2		681	420	17.5		310	1.0	4.0	220	30%	DAMPERS → 1/4 open @ 1102
45	20.6		643	400	17.25		299	.9	3.5	105	20%	DAMPERS → 1/8 open @ 1107
50	20.1		570	380	18.5		280	.8	3.0	140	20%	
55	19.6		551	350	19.0		270	.75	3.0	120	20%	DAMPERS → 1/4 @ 1118
60	19.2		530	340	20.0*		272	.90	3.0	140	20%	

Comment Number: Pump on O_2 meter not functional - will not operate

Page 2 of 4

Operating Parameters

Run # 12 Date 8/27/81 Clock Time (24 H) ______ Operator

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES			O2	Consumee ~~Catalyst~~		NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	~~Opacity~~ Meter	Pre	Post	CO %	CO_2 %	HC ppm		
65	18.6		524	320	quit OPERATING		267	.7	3.0	120	25%	
72	18.0		520	320	↓		261	.80	3.0	120	20%	
80	17.3		510	300			251	.85	3.0	140	20%	
85	17.0		509	300			246	.75	3.0	120	15%	
90	16.5		481	290			233	.70	2.5	100	15%	DAMPERS → 1/2 Turn open
95	16.0		509	280			250	.95	2.5	185	35%	
101	15.5		528	285			260	1.0	2.0	220	40%	
105	15.0		523	280			259	1.0	3.0	225	40%	
110	14.7		518	290			260	1.0	2.5	195	30%	
115	14.4		514	290			262	.95	2.5	180	30%	
120	13.8		524	290			261	.90	3.0	170	25%	DAMPERS → 3/4 T. open 12:18
126	13.6		515	290			288	.95	3.0	200	35%	
130	13.2		517	295			266	1.0	3.0	200	30%	

Comment Number: Filter Change at 1223 → 1226

page 3 of 4

Operating Parameters

Run 12 Date 8/27/81 Clock Time (24 H) ______ Operator SEN

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	Opacity Meter	Consumer ~~Catalyst~~		CO %	CO_2 %	HC ppm		
						Pre	Post					
135	12.3		456	300			287	.80	4.0	220	30	DAMPERS → 1 turn @ 12:37
140	11.8		466	320			293	.80	4.0	190	20	DAMPERS to 1½ turn @ 12:41
145	11.0		494	320			372	.65	4.5	160	20	
150	10.4		510	350			357	.65	4.25	150	20	
155	9.8		501	360			347	.65	4.5	155	20	
160	9.3		519	370			330	.70	3.5	175	20	
165	8.8		622	380			352	.55	4.5	130	15	DAMPERS to 1¼ @ 1307
171	7.9		620	385			336	.55	4.0	120	15	
175	7.3		568	390			322	.65	3.5	135	15	
180	7.1		534	380			311	.70	3.0	150	20	
185	6.8		537	370			308	.72	3.25	155	30	
190	6.4		511	360			292	.75	3.0	155	25%	
195	5.9		504	350			284	.80	3.0	160	30%	

Comment Number:

Page 4 of 4

Operating Parameters

Run # 12 Date 8-27-81 Clock Time (24 H) ______ Operator SBM

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

		TEMPERATURES				Consumer		NDIR				
Elasped Time Minutes	Fuel Weight lbs	Combustion Air	Combustion Chamber	Stove Surface	Opacity Meter	Pre	Post	CO %	CO$_2$ %	HC ppm	Opacity	Comments (Footnotes)
200	5.6		478	340			273	.80	3.0	135	20%	DAMPERS → 2 turns @ 1348
210	5.1		499	320			305	.80	3.25	140	15%	
220	4.5		470	310			283	.80	3.0	120	15%	
225	4.3		469	300			279	.80	3.0	100	10%	
230	4.1		453	280			273	.80	3.0	90	10%	open door to poke @ 14:12
235	3.7		592	290			409	.30	6.0	90	10%	DAMPER → 1 turn @ 1416
240	3.2		540	380			393	.40	4.0	90	10%	
245	2.9		496	400			312	.50	3.5	95	10%	
250	2.7		465	380			281	.55	3.25	90	10%	
255	2.5		413	360			276	.50	2.75	90	10%	Dampers → 2 turn @ 1435
258	2.3		427	350			287	.40	2.75	70	10%	14:39 - END

Comment Number:

245

246

pa 1 2 5wi 2.3 lbs

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ 1.84 Date 8-27-81 Train Operators DCP
Run # 12 Phase # N.A. Clock Time (24 H) 1020-1439
Sample Box # 1Wapp#2 Stack Dimensions 8" Ø
Probe Length 3' Barometric Pressure 29.88" Hg
Probe Material Steel Nozzle Diameter 0.502" Ø

leak check < 02 @ 22" Hg VAC

Cp = 0.824

after consumer Chamber

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments		
			Calc.	Act.		T in	T out			Imp.	WB	DB	#7	#8	DcM
0	617.069			.50	224	73	72	0	295	63			254	390	est 25
1.5				.50	278								412		
3.0		.008		.50	492								762	11.15	
4.0		.005		.50	580								607		
5	619.11			.50	537				279	63			580		
7		.004		.50	455			0					453	1185	
10	621.09	.004	.10	.35	412	76	73		284	57			442		
15	622.71	.005	.13	.20	384	76	76		287	57			441		
20	624.12	.005		.20	289			2					349	851	
28	625.95	.005	.13	.20	221	78	78		288	63			318	764	
34		.005	.13	.20	224			6					306		
40	628.04	.004	.16	.20	225	80	81		290	65			313		est 15
50	630.14	.004	.18	.20	201	81	82	12	289	64			285	590	11
62	632.68	.004	.18	.20	188	82	83	9	271	66			267	526	
74	635.48	.004	.18	.20	188	83	85	16	287	68			262		8

pg. 2 of [illegible]

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ ______ Date 8-27-81 Train Operators ______
Run # 12 cont Phase # N.A. Clock Time (24 H) —1439
Sample Box # ______ Stack Dimensions ______
Probe Length ______ Barometric Pressure ______
Probe Material ______ Nozzle Diameter ______

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments		
			Calc.	Act.		T in	T out			Imp.	WB	DB	#7	#8	EM
#1 80	637.14	.003	.16	.20	147	83	84	14	285	68			257	512	
92	640.19	.003	.16	.20	143	83	85	14.5	283	72			238		
105	643.26	.003	.16	.20	172	83	85	16	285	66			257		est 8
121	646.96	.003	.16	.20	180	83	85	19	287	68			256		
* 123	647.	.003	.16	.20	169	83	86	0	[illegible]	68			263		11
135	650.54	.003	.16	.20	217	85	87	0	253	64			296	466	
150	653.92	.003	.16	.20	~~[illegible]~~ 256	86	87	0	270	68			349	571	
174	659.86	.003	.16	.20	246	89	90	0	285	73			374		
187	662.95	.003	.16	.20	217	89	91	0	286	73			293		
199	665.87	.003	.16	.20	176	90	92	0	288	70			276		
213	669.18	.003	.16	.20	262	90	92	0	289	68			292	502	
228	672.84	.003	.16	.20	211	91	92	0	290	69			262		
242	674	.003	.16	.20	201	92	93	0	291	71			315		
255	679.225														

* S/S 1223 - 1226 hrs to change front filters

Oregon Method 7 Sample Recovery Data Sheet

27

Stove Name
Date 8-25-81
Run # 12 Phase # 2 Clock Times (24 H)
Box # 2

CONDENSED WATER DETERMINATION

Impinger:	#1	#2	#3	#4	Total Condensate
Final Weight	602.6	532.1	431.2	789.0	
Initial Weight	520.7	525.7	429.5	770.0	
Net Weight	81.90	6.40	1.70	19	total 119
	074	100			

FILTER IDENTIFICATIONS

Front Filter-First Filter # 060 Back Filter-First Filter # 228
Front Filter-Second Filter # ____ Back Filter-Second Filter # ____

WASH IDENTIFICATION

Probe/Front Filter Wash ____
Impinger Wash ____
Blank ____

CREOSOTE COUPONS

Plate Location ____ Plate Location ____
Plate Identification ____ Plate Identification ____

	Date	Mg 13A	Date	Mg 13B
Tare				
		73.7026		67.2856
Final		73.7476		67.3516
Net		.0450		.0660
		45.0 mg		66.0 mg

Laboratory Total Particulate Calculations

Stove Name ____________________ Date of Sampling 8/27/81
Run # 12 Phase # ____________ Date of Analysis [illegible]
Box # 2 Analyst [illegible]

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 246 (ml) of Acetone
Final 74.0538 (mg) - Tare 73.6314 (mg) net 422.4 mg
- Blank ((.009 mg/ml)(246 ml) = 2.214 mg) = 420.186 mg

II. Filter catch(es). F# ~~060~~ 074 B# 228
Front filter Final 0.5469 (mg) - Tare 0.4682 (mg) = 78.7 Front
+ Back-up filter Final 0.5127 (mg) - Tare 0.4689 (mg) = 43.8 mg Total
0.3385 g 0.2150 g 128.5 Back 300.8 mg

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2CL2 85 ml
Final [illegible] (mg) - Tare [illegible] (mg) net 578.5 mg
- Blank((.0025 mg/ml)(85 ml) = .2125 mg) = 578.28 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.

Final 72.4818 (mg) - Tare 71.8461 (mg) net 635.7 mg
- Blank ((.006 mg/ml)(272 ml total
- 100 ml condensed = 172 ml) = 1.03 mg) = 634.67 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Acetone 366 ml
Final 74.1254 (mg) - Tare 73.0368 (mg) net 818.6 mg
- Blank ((.009 mg/ml)(366 ml) = 3.294 mg) = 1085.3 mg

VI. Other particulate catches. = ______ mg

VII. Total particulate = I+II+III+IV+V+VI = 3014.33 mg

Blanks

Acetone Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Methylene chloride Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Water Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Other Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
	[illegible]	[illegible]		
	15	15	10	
	10	10	10	[illegible]
	15	15	15	5
	10	15	30	30
	30	40	35	35
	35	35	30	30
	30	35	35	35
	35	35	35	35
	35	35	35	35
11:10	25	25	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	440	460	450	460

Avg 22.63

Time	0	1/4	1/2	3/4
[illegible]	[illegible]		[illegible]	[illegible]
	[illegible]	[illegible]	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	25	25	25	25
	25	25	25	25
	25	25	25	20
	20	20	25	25
	25	25	25	25
1310	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	20	20	20	20
	420	420	425	420

AVE 21.06

Stove Name ___ ___
Date ___
Clock Times (24 H) ___
Run # ___
Phase # ___
Observer [illegible]
Distance to Source [illegible]
Direction to Source [illegible]
Wind Direction [illegible]
Wind Velocity [illegible]
Cloud Cover [illegible]
Plume Background [illegible]
Stability [illegible]
Relative Humidity ___
Type Contaminant [illegible]
Color [illegible]

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

___ Units No. ___

Minutes of Observation ___

250<

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
[illegible]	10	10	10	10
	10	10	10	10
	10	10	10	10
	10	10	10	10
	10	10	10	10
	10	10	10	10
	10	10	10	10
	10	10	10	10
	10	10	10	10
	10	10	10	10
	10	10	10	10
	10	10	5	5
	5	5	5	5
	5	10	10	
	130	135	130	120

AVE 9.36

Time	0	1/4	1/2	3/4

Stove Name ____________

Date [illegible]

Clock Times (24 H) [illegible]

Run # 12

Phase # ____________

Observer [illegible]

Distance to Source 30'

Direction to Source SE

Wind Direction West

Wind Velocity 0-5

Cloud Cover 0%

Plume Background [illegible]

Stability [illegible]

Relative Humidity ____________

Type Contaminant [illegible]

Color white

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

_____ Units No. ____________

Minutes of Observation ____________

Bacharach Smoke Spot

Run #12

Date 8/27/81

Operator JC

Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value	Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value
120	1125	5	162	7					
121	1131	0		7					
122	1223	5	170	7					
123	1215	0	~~170~~	7					
124	1249	5	250	7					
125	1254	0	150	6					
126	1336	5	208	7					
127	1338	0	130	6					
128	1427	5	179	5					
129	1430	0	140	5					

Comments:

ORSAT DATA

Stove Name ________ Date [illegible]

Run # [illegible] Phase # ______ Operator [illegible]

Sample Time 1111

	CO_2	O_2	CO	N_2
Accumulative	3.5	19.0	19.7	
Net	3.5	15.5	0.7	

Sample Time 1202

	CO_2	O_2	CO	N_2
Accumulate	3.4	19.6	20.5	
Net	3.4	16.2	0.9	

Sample Time 1236

	CO_2	O_2	CO	N_2
Accumulate	3.7	20.2	20.6	
Net	3.7	16.5	0.4	

Sample Time 1303

	CO_2	O_2	CO	N_2
Accumulate	4.3	20.0	20.4	
Net	4.3	15.7	0.4	

Sample Time 1319

	CO_2	O_2	CO	N_2
Accumulate	3.4	19.8	20.3	
Net	3.4	16.4	0.5	

1606

ORSAT DATA

Stove Name ____________ Date ____________

Run # 2 Phase # ____ Operator ____________

Sample Time 13.13

	CO_2	O_2	CO	N_2
Accumulative	2.6	19.6	20.2	__
Net	2.6	17.0	0.1	__

Sample Time 1431

	CO_2	O_2	CO	N_2
Accumulate	2.8	20.0	20.2	__
Net	2.8	17.2	0.2	__

Sample Time ____________

	CO_2	O_2	CO	N_2
Accumulate	__	__	__	__
Net	__	__	__	__

Sample Time ____________

	CO_2	O_2	CO	N_2
Accumulate	__	__	__	__
Net	__	__	__	__

Sample Time ____________

	CO_2	O_2	CO	N_2
Accumulate	__	__	__	__
Net	__	__	__	__

251<

16.36

Moisture Data

Stove Name ______

Date [illegible]

Run # 2

Phase # -

Operator [illegible]

Time (24 H)	Temperature		Moisture Percent
	Wet Bulb	Dry Bulb	
1105	130	260	11
1138	115	200	7
1234	130	270	11
1315	120	260	7

Wood Moisture

Date 7-27-81 Test Run # 12

Operator JC

Meter Measurement

Uncorrected

FUEL		A	B	C	D	E	F	G	H	AVE	
1	95	20	22	21	19	30	30	31	30	25.4	
2	96	18	21	21	20	31	35	35	37	273	
3	98	16	22	22	18	30	29	30	31	24.8	
4	101	16	21	21	17	25	24	24	24	215	
5	102	14	18	18	13	23	22	22	21	17.4	
6	103	11	19	18	15	22	22	22	22	18.9	
7.	105	14	20	19	16	28	29	20	25	21.4	
8											
9										22.38	
10											
11											
12											
Kindling											

Total Mass 28.8

Percent Moisture 24 (Corrected, dry basis)

Total Mass (Dry Basis) ______

pa 1

Operating Parameters

Run # 13 Date 8/1/81 Clock Time (24 H) 1005 Operator SS 17

Stove Name

Fuel: Initial Charge (lb) 10 Remaining Coal Bed (lb) 8.5

Test Charge 7 pieces 26.8 lb; Kindling pieces 2.4 lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES			O2	CMS.		NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	~~Opacity~~ Meter	~~Catalyst~~ Pre	Post	CO %	CO2 %	HC ppm		
0	29.2			~~380~~	~~15~~			~~.55~~	~~7.0~~	~~110~~	~~15%~~	
5	—		467	380	15		301	.55	7.0	110	15%	
10	26.6		528	360	17.5%		343	.80	6.5	170	20%	
15	26.0		667	420	12.5		414	.85	9.0	95	5%	DAMPERS → 1½ open @ 1020
20	25.1		779	470	11.5		452	1.0	7.5	160	10%	DAMPERS → 1/2 open @ 1025
25	22.4		591	480	15.0		312	.80	6.0	160	20%	
30	21.6		568	450	15.0		285	.75	4.5	160	30%	
35	20.9		548	420	15.75		259	1.0	5.0	210	30%	
40	20.1		575	410	15.50		251	1.0	5.0	220	35%	
45	19.2		581	400	15.5		262	1.0	5.0	200	25%	
50	18.6		595	400	15.25		268	.95	5.0	200	30%	DAMPERS → 1/4 open @ 1054
55	17.6		581	400	16.0		247	1.0	3.6	220	30%	(TO PHASE II)
60	16.8		572	380	—		234	.90	3.6	170	20%	

Comment Number: DOORS CLOSED @ 1006 - DAMPERS FULL OPEN

page 2 of 5

Operating Parameters

Run # 13 Date 9/1/81 Clock Time (24 H) ______ Operator SS R

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES Combustion Air	Combustion Chamber	Stove Surface	O_2 ~~Opacity~~ Meter	Conv. ~~Catalyst~~ Pre	Post	NDIR CO %	CO_2 %	HC ppm	Opacity	Comments (Footnotes)
65	16.6		575	360	16.5		216	.85	3.25	160	25	
70	16.1		575	340	16.25		209	.80	3.5	160	30	
75	15.6		579	320	16.50		207	.825	3.5	170	30	
80	15.1		521	320	16.25		204	.80	3.25	175	35	DAMPERS → 1/2 T. open @ 1125
85	14.5		509	300	15.75		220	.75	3.5	165	30%	
90	14.0		503	325	16.25		219	.60	3.25	140	30%	
95	13.5		492	320	16.5		201	.62	3.0	150	25%	DAMPERS → 3/4 T open @ 1139
100	13.1		498	300	16.25		213	.55	3.25	135	25%	
105	12.6		481	305	16.5		210	.60	2.75	135	25%	DAMPERS → 1 turn open @ 1149
110	12.0		553	310	14.5		250	.65	6.0	145	20%	
115	11.4		575	350	15.0		261	.65	5.0	170	20	
120	10.8		539	390	16.0		231	.75	4.5	180	25%	
125	9.9		586	390	15.25		242	.75	4.5	175	25%	

Comment Number:

page 3 of 5

Operating Parameters

Run # 13 Date ______ Clock Time (24 H) ______ Operator SE T

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES			o2	Cons		NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	~~Opacity~~ Meter	~~Catalyst~~ Pre	Post	CO %	CO_2 %	HC ppm		
131	9.2		682	420	14.5		263	.70	5.5	160	20%	dampers → 1/2 J open @ 1216
135	8.7		717	460	15.25		275	.65	5.0	150	15%	dampers → 1/4 Jopen @ 1220
140	8.1		636	460	15.75		249	.65	4.0	170	15%	
145	8.0		625	450	15.50		236	.70	4.5	170	15%	
150	7.6		579	420	—		220	.80	4.0	185	20%	
155	7.3		590	410	16.0		215	.65	4.5	170	20%	
160	7.0		521	400	16.5		200	.80	3.25	180	20%	
165	6.7		504	370	16.5		—	.80	3.0	145	15%	dampers to → 1/2 @1250
170	6.4		562	360	15.75		204	.80	4.0	155	10%	
175	6.3		516	350	16.0		198	.75	3.6	115	10%	
180	6.0		512	350	16.0		198	.85	3.6	120	10%	
185	5.9		502	350	16.0		183	.90	3.6	130	10%	open & poked fire 1310 + damper → 1 [illegible]
190	5.8		553	360	15.0		210	.46	4.5	115		

Comment Number:

260

page 4 of 5

Operating Parameters

Run # 13 Date 9/1/81 Clock Time (24 H) ______ Operator SEN

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES Combustion Air	Combustion Chamber	Stove Surface	O_2 ~~Opacity~~ Meter	Cms. ~~Catalyst~~ Pre	Post	NDIR CO %	CO_2 %	HC ppm	Opacity	Comments (Footnotes)
195	5.6		560	390	16.0		294	.5	3.5	135	15	
200	5.3		521	390	16.5		280	.5	3.25	120	15%	
205	4.6		513	390	16.0		267	.50	3.5	110	15%	
210	4.5		487	390	16.5		267	.70	3.5	180	15%	open damper → 1½ @ 1338
215	4.4		521	385	16.5		279	.46	3.25	85	10%	
220	4.1		553	390	15.75		305	.45	3.6	85	10%	
225	3.9		536	400	16.5		300	.45	3.5	70	10%	
230	3.7		509	400			283	.45	3.5	65	10%	
235	3.5		500	400	16.5		269	.50	3.5	55	6%	open dampers → 2 turns @ 1359
240	3.3		514	400	16.75		282	.50	3.25	50	6%	
245	3.2		511	380	16.50		241	.50	3.25	55	6%	
250	3.0		517	380	16.5		240	.50	3.25	50		
255	2.8		523	370	16.75		292	.55	3.25	50		

Comment Number:

page 5 of 6

Operating Parameters

Run # 13 Date 9-1-81 Clock Time (24 H) ________ Operator SEA

Stove Name ________

Fuel: Initial Charge (lb) ________ Remaining Coal Bed (lb) ________

Test Charge ________ pieces ________ lb; Kindling ________ pieces ________ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES			O2	Comb.		NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	~~Opacity~~ Meter	~~Catalyst~~ Pre	Post	CO %	CO_2 %	HC ppm		
260	2.6		524	360	16.5		266	.55	3.0	50	6%	
265	2.5		530	360	16.5		273	.50	3.0	45	6%	
270	2.2		519	360	16.0		265	.55	3.0	40	6%	1434—END

Comment Number:

pa. 1 — Stop; 71 hr

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ 1.84 Date 9/1/81 Train Operators DLP
Run # 13 Phase # 1 Clock Time (24 H) 1003 — 1058
Sample Box # ~~NApp~~ #1 Stack Dimensions 8"Ø
Probe Length 6' Barometric Pressure 29.61" Hg
Probe Material Steel Nozzle Diameter 0.625"Ø

Cp = 0.803

Leak ck <.02 CFM @ 17" Hg VAC
medium %m fuel

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments		
			Calc.	Act.		T in	T out			Imp.	WB	DB	#7	#8	%m
0	679.321	.016		.4	169	79	77	0	282	-			174		est 25
1.5				.4	183					72			172		
2.5		.008		.4	210								245		
4		.007		.4	238								236		
6	681.57	.006	.36	.4	274	80	78	.5	285	64			300	465	
9	682.57	.006	.36	.4	308	79	79	.5	287	60			296		est 24
12	683.67	.006	.41	.42	335	80	79	1.5	292	58			366	553	22
15	684.77	.006	.39	.42	403	80	79	2	297	56			428	662	
20	686.62	.006		.42	378	82	81	2	281	65			426		
26	688.55	.005		.38	324	83	82	7	273	66			324	597	
33	690.91	.005	.40	.38	265	83	84	11	281	59			262	550	est 20
41	693.69	.004	.32	.35	248	85	84	14	295	57			252		
50	696.34	.004		.35	247	84	85	20	303	60			261	598	
55	697.823														

s/s 1058

pa. ~~2~~ 1

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ 1.84 Date 9/1/81 Train Operators DLP
Run # 13 Phase # 2 Clock Time (24 H) 1105-1433
Sample Box # Napp#2 Stack Dimensions 8"Ø
Probe Length 3' Barometric Pressure 29.61"Hg
Probe Material Steel Nozzle Diameter 0.502"Ø Cp = .824

leak ck <.02 CFM @ 20" vac

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments		
			Calc.	Act.		T in	T out			Imp.	WB	DB	#7	#8	
55	697.82	.005	.22	.40	141	85	86	.5	279	65			233		es118
61	699.92	.005	.22	.28	186	87	87	0	284	62			215		
72	703.14	.005	.22	.25	199	87	89	0	287	63			207		11
83	705.95	.005	.22	.25	220	86	87	0	286	65			219		
97	710.08	.005	.22	.25	234	87	88		286	67			217	480	es110
112	714.48	.005		.25	284	88	89	0	288	69			244	550	
125	718.11	.005		.25	299	89	90	0	288	67			258	699	
142	722.95	.005		.25	198	90	91	0	285	65			227	609	es18
161	728.32	.005		.25	186	90	91	0	287	66			199		
182	734.25	.005		.25	246	91	92	0	288	64			159		
209	741.63	.005		.25	253	91	92	0	288	66			279		
234	748.83	.005		.25	265	91	92	0	287	70			281	515	
263	757.248														

Oregon Method 7 Sample Recovery Data Sheet

Stove Name ______ Date 9/1/81

Run # 13 Phase # 1 Clock Times (24 H) ______

Box # 1

CONDENSED WATER DETERMINATION

Bc [illegible]
#1 185ml
#2 - 130ml

Impinger:	#1	#2	#3	#4	Total Condensate
Final Weight	583.7	538.6	428.8	7[illegible]	
Initial Weight	536.2	534.0	428	762.4	
Net Weight	47.5	4.6	0.8	3.50	Total 56.40

$\underbrace{47.5 \quad 4.6 \quad 0.8}_{52.9}$

FILTER IDENTIFICATIONS

Front Filter-First Filter # 073 Back Filter-First Filter # 229

Front Filter-Second Filter # ____ Back Filter-Second Filter # ____

WASH IDENTIFICATION

Probe/Front Filter Wash ______

Impinger Wash ______

Blank ______

CREOSOTE COUPONS

Plate Location TRANS. Plate Location PROBE

Plate Identification 14A Plate Identification 14B

Tare

Date	~~Mg~~	Date	~~Mg~~
	67.6692		56.5464
Final			
	67.6911		56.5774
Net	.0219 21.9 mg		.0310 31.0 mg

264<

Oregon Method 7 Sample Recovery Data Sheet

Stove Name ______ Date 9-1-81

Run # 13 Phase # 2 Clock Times (24 H) ______

Box # ______

CONDENSED WATER DETERMINATION

Impinger:	#1	#2	#3	#4	Total Condensate #1 - 148 ml #2 - 112
Final Weight	593.6	541.3	431.2	737.7	
Initial Weight	543.5	536.7	429.6	722.9	
Net Weight	50.1	4.6	1.6	14.80	Total 71.10

$\underbrace{50.1 \quad 4.6 \quad 1.6}_{56.3}$

FILTER IDENTIFICATIONS

Front Filter-First Filter # 072 Back Filter-First Filter # 230

Front Filter-Second Filter # ____ Back Filter-Second Filter # ____

WASH IDENTIFICATION

Probe/Front Filter Wash ______

Impinger Wash ______

Blank ______

CREOSOTE COUPONS

Plate Location TRANS Plate Location Probe

Plate Identification 15A Plate Identification 15B

Tare

	Date	~~Mg~~	Date	~~Mg~~
		56.2296		56.3700
Final				
		56.2500		56.4268
Net		.0204		.0568
		20.4 mg		56.8

265<

Laboratory Total Particulate Calculations

Stove Name ______ Date of Sampling 9-1-81
Run # ______ Phase # 1 Date of Analysis ______
Box # 1 Analyst ______

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 177 (ml) of Acetone
Final 74.3055 (mg) - Tare 74.1226 (mg) net 182.9 mg
- Blank ((.009 mg/ml)(~~[illegible]~~ 177 ml) = ~~[illegible]~~ 1.593 mg) = ~~[illegible]~~ 181.307 mg

II. Filter catch(es). F# 673 B# 229
Front filter Final 0.5863 (mg) - Tare 0.4695 (mg) ~~0.1163~~ .1168
+ Back-up filter Final ~~[illegible]~~ 0.6070 (mg) - Tare 0.2087 (mg) = 0.3983 mg

Total ~~514.6 mg~~ 515.1

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2CL2 85 ml
Final 68.2011 (mg) - Tare 67.9181 (mg) net 283.0
- Blank((.0025 mg/ml)(85 ml) = .2125 mg) = 282.7875 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.
Final 71.0569 (mg) - Tare 70.8311 (mg) net ~~227.8 mg~~ 225.80
- Blank ((.006 mg/ml)(245 ml total
- 52.9 ml condensed = 192.1 ml) = 1.52 mg) = 224.65 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Acetone
Final 72.1335 (mg) - Tare 71.7892 (mg) net 344.3 mg
- Blank ((.009 mg/ml)(263 ml) = 2.367 mg) = 341.93 mg

VI. Other particulate catches. = ______ mg

VII. Total particulate = I+II+III+IV+V+VI = 1545.8 mg

Blanks

Acetone Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Methylene chloride Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Water Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Other Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

1266<

Laboratory Total Particulate Calculations

Stove Name ______ Date of Sampling 9-1-81
Run # 13 Phase # 2 Date of Analysis ______
Box # 2 Analyst ______

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 186 (ml) of Acetone
Final 73.7777 (mg) - Tare 73.5410 (mg) net 236.7 mg
- Blank ((.009 mg/ml)(186 ml) = 1.674 mg) = 235.026 mg

II. Filter catch(es). F#C72 B#230
Front filter Final 0.5760 (mg) - Tare 0.4666 (mg) 0.1094
+ Back-up filter Final 0.5159 (mg) - Tare 0.2096 (mg) = 0.3063 mg
Total 415.7 mg

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2CL2 85 ml
Final 74.6480 (mg) - Tare 74.0622 (mg) net 585.8 mg
- Blank((.0025 mg/ml)(85 ml) = .2125 mg) = 585.5875 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.

Final 70.2511 (mg) - Tare 69.7805 (mg) net 470.6 mg
- Blank ((.006 mg/ml)(280 ml total
- 56.3 ml condensed = 223.7 ml) = 1.342 mg) = 469.25 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Acetone
Final 73.4454 (mg) - Tare 72.9790 (mg) net 466.4 mg
- Blank ((.009 mg/ml)(282 ml) = 2.538 mg) = 463.862 mg

VI. Other particulate catches. = ______ mg

VII. Total particulate = I+II+III+IV+V+VI = 2169.4 mg

Blanks

Acetone Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Methylene chloride Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Water Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Other Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
1005	25	30	30	30
6	30	30	30	30
7	30	30	30	30
8	35	35	40	40
9	40	45	40	40
1010	40	35	35	35
11	40	35	35	35
12	35	30	35	30
13	30	30	30	25
14	25	30	35	30
15	35	35	35	40
	365	365	375	365

Ave 33.4

Time	0	1/4	1/2	3/4

Stove Name ______
Date 9/1/81
Clock Times (24 H) 1005
Run # 13
Phase # 1
Observer DET
Distance to Source ~50ft
Direction to Source NE
Wind Direction W-NW
Wind Velocity ~0-1
Cloud Cover 50%
Plume Background trees
Stability ______
Relative Humidity >60%
Type Contaminant ______
Color ______

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

______ Units No. ______
Minutes of Observation ______

mucho moisture in plume - difficult to read actual smoke component

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
1105	20	25	20	15
6	20	20	25	20
7	25	20	20	20
8	15	20	20	20
9	20	20	20	20
10	20	20	20	20
11	25	20	15	15
12	15	15	20	20
13	20	15	15	20
14	20	15	20	20
15	20	20	20	20
1215	15	20	20	20
16	20	20	20	20
17	20	15	15	15
18	15	15	20	15
19	15	15	15	15
20	15	20	20	15
21	15	20	20	20
22	15	15	15	15
23	15	15	15	15
24	15	15	15	15
25	20	20	15	15
	400	400	405	390

AVE 18.1

Time	0	1/4	1/2	3/4

Stove Name ______

Date 9/1/81

Clock Times (24 H) 1107

Run # 13

Phase # 2

Observer PET

Distance to Source ~50ft

Direction to Source NE

Wind Direction ~NW

Wind Velocity 0-1

Cloud Cover 50%

Plume Background trees

Stability ______

Relative Humidity >50%

Type Contaminant ______

Color ______

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

____ Units No. ______

Minutes of Observation ______

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
1333	20	20	20	25
34	25	25	25	25
35	25	20	25	20
36	25	25	25	25
37	25	25	25	25
37	25	25	25	25
39	20	20	25	20
40	20	20	25	20
41	20	20	20	20
42	25	25	25	25
43	25	25	25	25
	255	250	265	255

Time	0	1/4	1/2	3/4

Stove Name ______

Date ______

Clock Times (24 H) ______

Run # 13

Phase # 2 cont'd

Observer PET

Distance to Source ______

Direction to Source ______

Wind Direction ______

Wind Velocity ______

Cloud Cover ______

Plume Background ______

Stability ______

Relative Humidity ______

Type Contaminant ______

Color ______

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

______ Units No. ______

Minutes of Observation ______

AVE 23.295

Bacharach Smoke Spot

Run 13 Date 9-1-81 Operator JC

Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value	Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value
~~[illegible]~~									
201	1030	S	294						
202	1035	O	175						
203	1211	S	253						
204	1215	O	~~2~~150						
20~~5~~6	1323	S	266	6					
20~~6~~7	1326	O	130	6					
20~~7~~ [illegible]	1415	S	262	3					
20~~8~~ [illegible]	1418	O	130	2					

Comments:

ORSAT DATA

Stove Name ______

Date 9-1-81

Run # 13

Phase # II

Operator JC

Sample Time 1117

	CO_2	O_2	CO	N_2
Accumulative	3.4	19.6	___	___
Net	3.4	16.2	–	___

Comment: The CO burette became clogged at the beginning of the test, therefore no readings were taken during phase I.

Sample Time 1255

	CO_2	O_2	CO	N_2
Accumulate	3.4	19.6	20.4	___
Net	3.4	16.2	0.6	___

Sample Time 1332

	CO_2	O_2	CO	N_2
Accumulate	3.4	20.0	20.3	___
Net	3.4	16.6	0.3	___

Sample Time 1405

	CO_2	O_2	CO	N_2
Accumulate	3.0	20.0	20.0	___
Net	3.0	17.0	0	___

Sample Time 1430

	CO_2	O_2	CO	N_2
Accumulate	2.4	20.2	20.6	___
Net	2.4	___	0.4	___

Moisture Data

Stove Name —
Date 9-1-81

Run # 13
Phase # I
Operator JC

Time (24 H)	Temperature		Moisture Percent
	Wet Bulb	Dry Bulb	
1017	155	440	22
1105	125	230	11
1237	115	230	8
1353	110	240	4

Wood Moisture

Date 9/1/81 Test Run # 13

Operator JC

Meter Measurement

FUEL #	A	B	C	D	E	F	G	H	AVE	
1 106	16	19	20	15	24	25	23	23	20.6	
2 107	14	19	19	15	26	27	27	27	21.8	
3 108	12	17	20	13	22	24	24	23	19.4	
4 110	~~29~~ 15	~~24~~ 20	20	14	27	27	27	27	22.1	
5 111	19	19	19	16	27	24	29	24	22.1	
6 112	16	19	18	20	26	23	24	23	21.1	
7 113	16	19	20	16	25	26	27	25	21.8	
8									21.3	23
9										
10										
11										
12										
Kindling										

Total Mass 26.8

Percent Moisture 23 (Corrected)

Total Mass (Dry Basis) ______

pi 1 · 1/1

fH2 → 10:0
1,3 END

Operating Parameters

Run # 14 Date 9/3/81 Clock Time (24 H) 10:50 Operator SEN

Stove Name

Fuel: Initial Charge (lb) Remaining Coal Bed (lb) .9 16

Test Charge 4 pieces 14.3 lb; Kindling Several pieces 2.5 lb

Elapsed Time Minutes	Fuel Weight lbs	TEMPERATURES Combustion Air	Combustion Chamber	Stove Surface	~~Opacity~~ O2 Meter	~~Catalyst~~ Pre	Post	NDIR CO %	CO2 %	HC ppm	Opacity	Comments (Footnotes)
0	16.8											
5	15.5		761	290	10.75		1014	.11	2.0	40	20%	DAMPERS → 2 turns @ 10:57
10	14.5		652	310	10.25		1102	.16	2.2	3.5	15%	DAMPERS → 3 turns @ 1104
15	13.6		600	320	12.50		1150	.065	1.2	25	25%	DAMPERS → 2 turns @ 1107
20	12.8		535	500	13.5		1032	.44	5.0	100	15%	(Changed Surf. Temp. Reading to Top of Stove)
25	12.1		526	460	15.0		1002	.40	5.0	140	12%	DAMPERS → 3.0 turns @ 1118
30	11.4		473	450	14.5		1002	.36	4.5	165	15%	
35	10.8		492	450	13.25		1098	.44	5.5	150	10%	
40	10.1		520	480	13.25		1131	.46	6.0	160	8%	
45	9.2		566	490	12.5		1081	.46	6.0	170	8%	
ASE 50	8.2		① 870	500	10.5		1122	.50	7.0	145	8%	DAMPERS to 3/4 @ 1142
2 55	7.6		787	525	11.0		1039	.61	7.5	115	8%	DAMPERS → 1/2 @ 1147
60	6.8		738	530	11.5		850	.50	7.0	125	15%	DAMPER → 1/4 @ 1150

Comment Number: ①—Rearrange T.C in fire Box (J.C)

275

pa. 2

Operating Parameters

Run # 14 Date 9/3/81 Clock Time (24 H) ______ Operator SE

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	~~Opacity~~ O_2 Meter	Catalyst		CO %	CO_2 %	HC ppm		
						Pre	Post					
65	6.5		685	500	13.0	7	791	1.0	7.0	190	15%	
71	6.1		652	451	13.5		725	1.0	6.5	210	10%	
75	5.9		633	420	12.75		711	1.0	7.0	185	10%	
80	5.7		609	400	13.0		697	1.0	6.5	185	10%	
86	5.5		557	381	12.25		563	.95	7.0	220	10%	open doors @ 1218 to poke fire
90	5.4		598	370	10.5		603	.50	7.5	150	20%	
95	5.3		579	370	—		820	.70	7.0	135	20%	
100	5.2		567	380	12.5		817	.55	6.0	125	15%	
105	4.9		547	380	13.25		786	.60	6.0	135	15%	
110	4.6		560	380	13.0		758	.50	7.0	120	10%	
115	4.4		557	380	13.75		740	.55	6.0	135	15%	
120	4.2		640	385	13.25		732	.80	6.0	190	20%	
125	4.0		684	380	13.25		758	.80	6.0	190	20%	

Comment Number:

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Operating Parameters

Run # 14 Date 9/3/81 Clock Time (24 H) ______ Operator ST

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES			O_2			NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	~~Opacity~~ Meter	Catalyst Pre	Catalyst Post	CO %	CO_2 %	HC ppm		
130	3.8		658	370	13.5		756	.82	6.0	185	20%	
135	3.7		603	365	14.5		750	.75	5.0	170	20%	
140	3.4		584	350	15.0		767	.75	5.25	185	15%	
145	3.3		593	350	14.25		750	.75	5.5	200	20%	
150	3.1		598	340	13.5		753	.75	5.5	200	20%	
155	2.9		597	340	13.75		736	.75	5.0	210	15%	
160	2.8		589	330	14.5		714	.70	5.0	180	12%	
165	2.5		606	330	14.25		668	.70	5.5	175	10%	
170	2.4		613	310	14.0		669	.65	5.25	170	10%	
175												open door @ 1347 to Poke Fire
180	2.1		579	300	8.75		655	.85	7.5	310	20%	
185	1.9		551	300	11.75		700	.75	7.0	290	15%	
190	1.8		547	300	11.5		681	.70	7.0	840	15%	

Comment Number:

pa. 4 4

Operating Pe~~r~~imeters

Run # 14 Date 9/3/81 Clock Time (24 H) ______ Operator ______

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	O_2 ~~Opacity~~ Meter	Catalyst		CO %	CO_2 %	HC ppm		
						Pre	Post					
195	1.7		553	300	12.75		660	.65	7.0	220	15%	
200	1.6		603	300	11.5		623	.70	7.5	210	10%	
205	1.4		610	300	12.0		616	.70	7.5	200	10%	
209	1.3		602	290	11.75		600	.55	5.0	170	10%	End of Run 14[illegible]

Comment Number:

Page 1 of 1

[illegible]

Oregon Method 7 Sampling Data Sheet

Stove Name ____ H@ 1.84 Date 9/3/81 Train Operators DCP
Run # 14 Phase # 1 Clock Time (24 H) 1050–1132
Sample Box # Napp#1 Stack Dimensions 6" Ø
Probe Length 6' Barometric Pressure 29.70" Hg
Probe Material steel Nozzle Diameter 0.625" Ø

leak ck < .02 CFM @ 17" Hg vac

Cp = .803

Post Catalyst Chamber

Elapsed Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments		
			Calc.	Act.		T in	T out			Imp.	WB	DB	#7	#8	% [illegible]
0	757.377			.40	157	76	75	.5	301				93		est 25
1.5				.40	201								219		
3.5		.008		.40	234	76	74		298.	63			178	535	
4		.005		.40	270								825	577	
6		.006	.33	.40	301	77	75		284	66			950		
9	760.62	.006	.33	.40	322								1027		
13	762.13	.005	.34	.40	344	77	75	0	245	68					
21	765.07	.005		.40	338	80	79	1	256	60			1050	540	14
28	767	.004	.33	.35	334	81	81	0	273	60			887		
35	770.04	.004		.35	368	82	82			59			1095		
42	772.298														

page 1 of ___ and p. 3 ...

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ 1.84 Date 9/3/81 Train Operators Dcp
Run # 14 Phase # 2 Clock Time (24 H) 1137–1420
Sample Box # Napp#2 Stack Dimensions 6"Ø
Probe Length 3' Barometric Pressure 29.76"Hg leak ck < .02CFM @ 20"Hg vac
Probe Material Steel Nozzle Diameter 0.502" Cp = 0.824

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments		
			Calc.	Act.		T in	T out			Imp.	WB	DB	#7	#8	%M
42	772.298	.004	.18	.30	227	83	74	2	252				1095		
49	774.53	.004	.18	.22	362	85	85	.5	271	64			1054	856	est 11
60	777.38	.004		.22	242	86	86	1	282	64			798		
70	780.18	.004		.22	202	87	87	1	284	63			721	639	
83	783.70	.004		.22	227	87	88	1	286	65			631	600	
99	787.73	.004		.22	206	88	88	3	288	67			798	550	11
113	791.38	.004		.22	200	88	89	6	289	67			735		
130	795.19	.003	.14	.16	199	88	89	9	293	70			776		
145	798.75	.003		.16	193	89	89	10	291	70			751	599	
159	801.97	.003		.16	193	89	89	10	294	71			692		
171	804.81	.003		.16	192	88	89	11	291	73			668		5
184	807.52	.003		.16	155	89	89	13	290	76			698		
199	810.88	.003		.16	153	88	90	15	289	77			620		
305	812.293														

Oregon Method 7 Sample Recovery Data Sheet

Stove Name ______ Date 9/3/81

Run # 14 Phase # 1 Clock Times (24 H) ______

Box # 1

CONDENSED WATER DETERMINATION

Impinger:	#1	#2	#3	#4	Total Condensate
Final Weight	571.2	539.7	428.3	769.3	
Initial Weight	530.6	536.1	428.0	765.6	
Net Weight	40.6	3.6	0.3	3.7	total 48.4

$\underbrace{40.6 \quad 3.6 \quad 0.3}_{44.5}$

FILTER IDENTIFICATIONS

Front Filter-First Filter # 071 Back Filter-First Filter # 231

Front Filter-Second Filter # ____ Back Filter-Second Filter # ____

WASH IDENTIFICATION

Probe/Front Filter Wash ______

Impinger Wash ______

Blank ______

CREOSOTE COUPONS

Plate Location 16 A Plate Location 16 B

Plate Identification [illegible] Plate Identification Tape (sample)

Tape

	Date	Mg		Date	Mg
		56.3287			56.1061
Final					
		56.3435			56.1247
Net		.0148			.0236
		14.8 mg			23.6 mg

#1 – 138

– 100

Oregon Method 7 Sample Recovery Data Sheet

Stove Name ______ Date 9/3/81

Run # 14 Phase # 2 Clock Times (24 H) ______

Box # 2

CONDENSED WATER DETERMINATION

Impinger:	#1	#2	#3	#4	Total Condensate
Final Weight	584.7	527.0	430.7	746.7	
Initial Weight	525.9	522.6	429.4	737.8	
Net Weight	58.8	4.4	1.3	8.9	Total 7340 ML
		64.5			

FILTER IDENTIFICATIONS

Front Filter-First Filter # 07C Back Filter-First Filter # 232

Front Filter-Second Filter # ____ Back Filter-Second Filter # ____

WASH IDENTIFICATION

Probe/Front Filter Wash ______

Impinger Wash ______

Blank ______

CREOSOTE COUPONS

Plate Location TRANS. Plate Location Probe

Plate Identification 17A Plate Identification 17B

Tape

	Date	Mg	Date	Mg
		55.8745		55.4805
Final				
		55.8897		55.5130
Net		.0152		.0325
		15.2mg		32.5mg

#1- 158ml

#2- 100

282<

Laboratory Total Particulate Calculations

Stove Name ____________ Date of Sampling 9-3-81
Run # 14 Phase # 1 Date of Analysis ____________
Box # 1 Analyst ____________

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 169 (ml) of Acetone
Final 70.7315 (mg) - Tare 70.6551 (mg) net 76.4 mg
- Blank ((.009 mg/ml)(169 ml) = 1.521 mg) = 74.879 mg

II. Filter catch(es). F# 871 B# 231
Front filter Final 0.6101 (mg) - Tare 0.4666 (mg) 0.1435
+ Back-up filter Final 0.2673 (mg) - Tare 0.2150 (mg) = 0.0523 mg
Total 195.8 mg

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2CL2 85 ml
Final 74.7266 (mg) - Tare 74.5801 (mg) net 146.5 mg
- Blank ((.0025 mg/ml)(85 ml) = .2125 mg) = 146.2875 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.

Final 72.6122 (mg) - Tare 72.4511 (mg) net 161.1 mg
- Blank ((.006 mg/ml)(226 ml total
- 44.5 ml condensed = 181.5 ml) = 1.089 mg) = 160.011 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Acetone
Final 72.9686 (mg) - Tare 72.6597 (mg) net 308.9 mg
- Blank ((.009 mg/ml)(253 ml) = 2.277 mg) = 306.623 mg

VI. Other particulate catches. = ______ mg

VII. Total particulate = I+II+III+IV+V+VI = 883.59 mg

Blanks

Acetone Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Methylene chloride Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Water Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Other Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Laboratory Total Particulate Calculations

Stove Name ______ Date of Sampling 9-3-81
Run # 14 Phase # 2 Date of Analysis ______
Box # 2 Analyst ______

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 148 (ml) of Acetone
Final 72.7896 (mg) - Tare 72.6092 (mg) 180.4 mg
- Blank ((.009 mg/ml)(148 ml) = 1.332 mg) = 179.07 mg

II. Filter catch(es). F#070 B#232
Front filter Final 0.5755 (mg) - Tare 0.4696 (mg) 0.1059
+ Back-up filter Final 0.5487 (mg) - Tare 0.2120 (mg) = 0.3367 mg
Total 442.6 mg

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2CL2 85 ml
Final 70.3663 (mg) - Tare 69.7881 (mg) net 578.2 mg
- Blank((.0025 mg/ml)(85 ml) = .2125 mg) = 578 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.

Final 72.2395 (mg) - Tare 71.8461 (mg) net 393.4 mg
- Blank ((.006 mg/ml)(248 ml total
- 64.5 ml condensed = 183.5 ml) = 1.101 mg) = 392.3 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Acetone
Final 74.6183 (mg) - Tare 73.8680 (mg) net 750.3 mg
- Blank ((.009 mg/ml)(~~248~~ 253 ml) = 2.277 mg) = 748.023 mg

VI. Other particulate catches. = ______ mg

VII. Total particulate = I+II+III+IV+V+VI = 2340 mg

Blanks

Acetone Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Methylene chloride Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Water Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Other Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
1107	15	[illegible]	[illegible]	[illegible]
	10	[illegible]	[illegible]	[illegible]
	10	15	10	10
10	10	10	15	10
11	10	10	10	10
12	15	20	20	20
13	10	10	15	20
14	20	20	15	10
15	10	10	10	10
16	10	10	10	10
17	15	15	15	15
	135	145	150	140

AVE = 12.95

Time	0	1/4	1/2	3/4

Stove Name

Date 9/3/81

Clock Times (24 H) 1107

Run # 14

Phase # 1

Observer PET

Distance to Source ~50 ft

Direction to Source NW

Wind Direction NE

Wind Velocity ~2-4

Cloud Cover 0

Plume Background Trees/rooftops

Stability

Relative Humidity

Type Contaminant

Color

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

Units No.

Minutes of Observation

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
[illegible]	[illegible]	5	10	10
[illegible]	[illegible]	[illegible]	5	5
[illegible]	5	10	5	5
[illegible]	<5	5	<5	5
[illegible]	5	<5	5	5
[illegible]	5	10	5	10
[illegible]	5	5	10	10
[illegible]	10	5	5	5
52	5	<5	<5	<5
53	5	10	5	5
1255	[illegible]	15	15	15
56	15	15	15	15
57	15	20	15	15
58	15	15	15	15
59	15	15	15	15
60	15	10	10	10
61	15	20	20	20
62	20	20	20	20
63	15	15	15	15
64	15	15	15	15
65	15	15	15	15

~~220~~ ~~235~~
220 230 220 235

AVE 10.8

Time	0	1/4	1/2	3/4
1415	5	5	<5	<5
16	<5	<5	<5	<5
17	<5	<5	<5	<5
18	<5	<5	<5	<5
19	<5	<5	<5	<5
20	5	5	5	<5
21	<5	5	5	5
22	<5	<5	<5	<5
23	5	<5	<5	<5
24	<5	<5	<5	<5
25	<5	<5	<5	<5

<5

AVE <5

Stove Name ______
Date 9/3/81
Clock Times (24 H) ______
Run # 14
Phase # 2
Observer PET
Distance to Source 200'
Direction to Source NW
Wind Direction E
Wind Velocity 0-1
Cloud Cover 0
Plume Background trees/[illegible]
Stability ______
Relative Humidity ______
Type Contaminant ______
Color ______

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

____ Units No. ______

Minutes of Observation ______

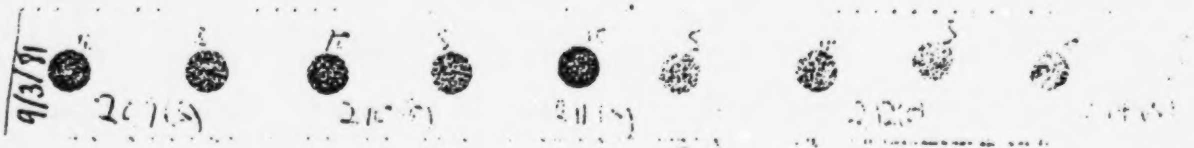
Bacharach Smoke Spot

Run 13 Date 9/3/7[illegible] Operator JC

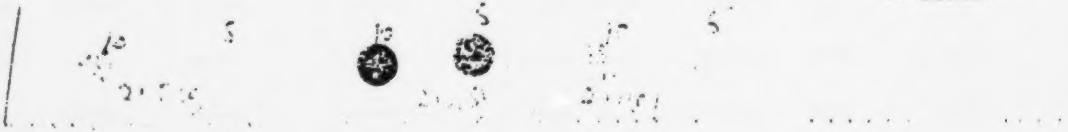
Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value	Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value
[illegible]	[illegible]	S	220						
210	[illegible]	O	170	[illegible]					
211	1229	S	200	6					
212	1235	O	100	6					
21~~3~~4	1336	S	190	6					
21~~4~~5	1339	O	95	4					
21~~5~~6	1412	S	152	7					
21~~6~~7	1417	O	70	4					

Comments:

Run 14



7 7 6 6 6



4 7 4

ORSAT DATA

Stove Name __________ Date __________

Run # 14 Phase # I Operator [illegible]

Sample Time 1125 Bench Orsat

	CO_2	O_2	CO	N_2
Accumulative	7.4	20.9	–	
Net	7.4	13.0	–	

Comment.

The CO solution is not absorbing. Readings are zero after 10 15 passes. The one test calibration on the CO yielded 73.6% for 7.25 cal gas

Sample Time 1150

	CO_2	O_2	CO	N_2
Accumulate	9.2	20.4	–	
Net	9.2	11.2	–	

Sample Time 1237

	CO_2	O_2	CO	N_2
Accumulate	6.2	20.2	–	
Net	6.2	14	–	

Changed to portable Orsat

Sample Time 1317

	CO_2	O_2	CO	N_2
Accumulate	6.4	19.3	19.6	
Net	6.4	12.9	0.3	

Sample Time 1327

	CO_2	O_2	CO	N_2
Accumulate	5.7	19.6	20.0	
Net	5.7	13.9	0.4	

Reproduced from best available copy.

ORSAT DATA

Stove Name ______ Date [illegible]

Run # [illegible] Phase # [illegible] Operator [illegible]

Sample Time 1305

	CO_2	O_2	CO	N_2
Accumulative	7.4	19.2	19.5	___
Net	7.4	11.8	0.3	___

Portable Orsat

Sample Time ______

	CO_2	O_2	CO	N_2
Accumulate	___	___	___	___
Net	___	___	___	___

Sample Time ______

	CO_2	O_2	CO	N_2
Accumulate	___	___	___	___
Net	___	___	___	___

Sample Time ______

	CO_2	O_2	CO	N_2
Accumulate	___	___	___	___
Net	___	___	___	___

Sample Time ______

	CO_2	O_2	CO	N_2
Accumulate	___	___	___	___
Net	___	___	___	___

Moisture Data

Stove Name

Date [illegible]

Run # [illegible]

Phase # I

Operator [illegible]

Time (24 H)	Temperature		Moisture Percent
	Wet Bulb	Dry Bulb	
1117	140	350	14
1227	130	260	11
1349	110	290	5

Wood Moisture

Date [illegible] Test Run # 14

Operator [illegible]

Meter Measurement

Corrected

FUEL	Log #	A	B	C	D	E	F	G	H	AVE	Ave
1	104	12	19	20	16	22	23	22	19	19.1	20
2	114	17	20	21	17	25	27	25	22	21.8	23
3	115	13	20	18	13	25	22	23	23	19.6	21
4	116	13	17	19	12	23	24	23	23	19.2	21
5											
6											
7											
8											
9											
10											
11											
12											
Kindling											

Total Mass 14.3

Percent Moisture 21%

Total Mass (Dry Basis) 11.3

Operating Parameters

Run # 15 Date 9/4/81 Clock Time (24 H) 10:35 Operator SEm

Stove Name

Fuel: Initial Charge (lb) Remaining Coal Bed (lb) 1.1

Test Charge pieces 14.5 lb; Kindling pieces 2.1 lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES Combustion Air	Combustion Chamber	Stove Surface	O2 ~~Opacity~~ Meter	Catalyst Pre	Catalyst Post	NDIR CO %	CO$_2$ %	HC ppm	Opacity	Comments (Footnotes)
0	16.6											10:38 CLOSED Doors Dampers – FULL
5	14.8		1149	410	11.5		1165	.40	8.5	125	15	10:41 – Dampers 1 1/2 open
10	14.1		1074	430	13.0		993	—	—	~~25~~	10	Dampers → 1/2 turn @ 10:45
15	13.6		832	450	14.5		825	.40	5.0	110	10	Dampers → 1/4 turn @ 1047
20	13.2		843	410	15.0		728	.42	5.0	140	10	Door open @ 1055 to poke fire
25	12.8		402	400	15.0		825	.28	3.6	95	15	Dampers → 1 turn @ 1059
30	12.3		401	400	15.0		734	.26	5.0	135	15	Doors open @ 1109 to Look (J.C)
35	11.9		389	370	15.5		773	.28	4.5	180	10	Dampers to 2 turns @ 1110
40	11.4		415	380	15.75		638	.26	4.5	190	15	
45	10.8		408	380	15.50		884	.26	4.0	175	15	
50	10.3		454	380	15.0		909	.30	5.0	195	15	
55	9.8		476	380	15.5		901	.27	4.0	170	15	
60	8.9		558	38	14.25		935	.42	5.5	185	18	

Comment Number: LOADING Arrangement has effect on Combustion Chamber Temp Reading

page 2 of

Operating Parameters

Run # 15 Date 9/4/81 Clock Time (24 H) ______ Operator SR

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	Opacity Meter	Catalyst Pre	Catalyst Post	CO %	CO_2 %	HC ppm		
65	8.3		533	390	14.75		783	.37	3.6	125	15	
70	7.8		541	385	14.50		801	.48	4.5	230	20	
75	7.3		566	380	14.25		817	.50	4.5	235	20	
80	6.9		908	390	11.5		734	.38	7.0	160	<5	
85	5.9		749	390	12.0		711	.29	8.0	110	<5	(change M-5 filters)
96	4.7		960	420	12.0		941	.25	7.5	80	<5	dampers → Horn @ 1213
100	4.2		1128	425	11.5		948	.31	7.5	105	<5	
105	4.0		⊛ 868	440	12.0		948	.39	8.0	110	<5	
110	3.5		⊛ 867	450	12.0		921	.39	8.5	105	<5	
115	3.2		⊛ 1384	450	12.5		940	.38	7.5	110	<5	
120	2.8		1261	450	12.5		915	.33	8.0	100	<5	
125	2.5		1271	440	12.25		909	.24	8.5	75	<5	
130	2.2		1214	430	13.0		914	.35	8.0	95	<5	

Comment Number: ⊛ moved J.C to the Front of Stove Chamber 1200 1140 pa 3 –

Operating Parameters

Run # 15 Date 9/4/81 Clock Time (24 H) ______ Operator SEW

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	Opacity Meter	Catalyst Pre	Catalyst Post	CO %	CO_2 %	HC ppm		
135	1.9		1034	430	12.5		924	.32	7.5	100	<5	
140	1.7		1100	430	12.25		893	.30	9.0	95	<10	
145	1.4		⊛ 948	440	13.0		868	.27	7.5	85	≤10	
150	1.2		915	430	13.0		847	.24	7.5	75	≤10	Ent'd 1306
			[illegible]	1736	50.[illegible]		[illegible]	[illegible]	31.5	[illegible]	35	
		[illegible]	[illegible]	29	29		[illegible]	[illegible]				
150 min.	15.9 lbs		811	412	13.5		[illegible]	0.33	6.3	134	<10	

Comment Number:

pa... 1 .. ___

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ 1.84 Date 9/4/81 Train Operators DLP

Run # 15 Phase # NA Clock Time (24 H) 1035 – 1305

Sample Box # Napp #2 Stack Dimensions 6"Ø

Probe Length 3' Barometric Pressure 29.69" Hg

Probe Material Steel Nozzle Diameter 0.502" Ø

leak ck < 0.02 CFM @ 15 "

Cp = 0.824

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments post catalyst chamber		
			Calc.	Act.		T in	T out			Imp.	WB	DB	#7	#8	% m
0	812.290			.4	295	77	75	1	293	63			446	748	est 25
1.5		doors open		.4	329								636	1374	
2.5		"		.4	362								875	1390	
4	813.87	shut .005		.4	394	77	76		291	59			830	1226	
6	814.56	.005		.25	394			0					1162	1238	
8	815.15	.005	.13	.17	366	78	77	0	290	59			1064	1172	est 23
12	816.10	.005	.13	.17	303			0					977		20
17	817.	.005	.13	.17	238	79	79		287	62			792		
23	818.78	.003	[illegible]	.17	245			0					688		est 18
30	820.	.003	.12	.15	247	82	82		286	63			737		
41	822.95	.003	.12	.15	306								820		
52	824.92	.003		.15	321	84	84	6.5	285	63			905	465	
66	827.36	.003		.15	319	84	86	9	286	69			818		
79	829.40	.003	.11	.15	326	85	88	15	286	69			753		est 15
*88.5	831.364	.003	.11	.15	381	86	88			78			932		

* d/s 1203 – 1212 hrs to change filters (both) and 2nd post filter # 234

page 2 of ____ STOP

Oregon Method 7 Sampling Data Sheet

Stove Name ____ H@ ____ Date 9/4/81 Train Operators ____
Run # 15 (cont) Phase # NA Clock Time (24 H) ____
Sample Box # ____ Stack Dimensions ____
Probe Length ____ Barometric Pressure ____
Probe Material ____ Nozzle Diameter ____

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments
			Calc.	Act.		T in	T out			Imp.	WB	DP	#7 #8 To4
94	832.76	.003	.11	.15	357	87	88	0	220	72			957 330 est 13
107	835.48	.003	.11	.13	325	88	90		258	62			1285
120	838.18	.003		.13	313	90	92	0	275	65			908
139	842.03	.003		.13	318	90	92		284	67			864
142	842.832												
[illegible]		0.956			(139)	[illegible]							
# Readings		16		19	19	26							
Average		0.0511		0.207	323	89							
		√ΔP avg											
133 mins	30.442 ft^3												

Oregon Method 7 Sample Recovery Data Sheet

Stove Name ______ Date 9/4/81
Run # 15 Phase # ______ Clock Times (24 H) ______
Box # 2

CONDENSED WATER DETERMINATION

Impinger:	#1	#2	#3	#4	Total Condensate
Final Weight	586.9	528.6	430.1	752.7	
Initial Weight	524.9	525.0	429.7	746.6	
Net Weight	62.0	3.6	0.4	6.10	TOTAL 72.10

66

FILTER IDENTIFICATIONS

Front Filter-First Filter # 084 Back Filter-First Filter # 233
Front Filter-Second Filter # 083 Back Filter-Second Filter # 234

WASH IDENTIFICATION

Probe/Front Filter Wash ______
Impinger Wash ______
Blank ______

CREOSOTE COUPONS

Plate Location TRANS. Plate Location Probe
Plate Identification 18A Plate Identification 18B

Tare

Date	Mg	Date	Mg
	55.6550		56.6992

Final

	Date	Mg	Date	Mg
		55.6774		[illegible]
Net		.0224		[illegible]
		22.4 mg		[illegible]

#1 - 156 ml
#2 - 98

Laboratory Total Particulate Calculations

Stove Name ______ Date of Sampling 9-4-81

Run # 15 Phase # — Date of Analysis ______

Box # 2 Analyst ______

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 105 (ml) of Acetone
Final 73.9218 (mg) - Tare 73.7597 (mg) net 162.1 mg
- Blank ((.009 mg/ml)(105 ml) = .945 mg) = 161.155 mg

II. Filter catch(es). F#083 (084) B#234 (233) #84 0.5519 - 0.4680 = 0.0839] FRONT
#83 0.4920 - 0.4707 = 0.0213
Front filter #233 Final 0.5313 (mg) - Tare 0.2122 (mg) 0.3191] Back
+ Back-up filter Final 0.2384 (mg) - Tare 0.2148 (mg) = 0.0236 mg
Total 447.9 mg

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2 Cl 2 85 ml
Final 71.5332 (mg) - Tare 71.3348 (mg) net 198.4 mg
- Blank((.0025 mg/ml)(85 ml) = .2125 mg) = 198.187 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.

Final 71.5512 (mg) - Tare 71.3341 (mg) net 217.1 mg
- Blank ((.006 mg/ml)(243 ml total
- 66 ml condensed = 177 ml) = 1.062 mg) = 216.04 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Acetone
Final 69.3678 (mg) - Tare 69.1272 (mg) net 240.6 mg
- Blank ((.009 mg/ml)(212 ml) = 1.903 mg) = 238.7 mg

VI. Other particulate catches. = ______ mg

VII. Total particulate = I+II+III+IV+V+VI = 1262 mg

Blanks

Acetone Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Methylene chloride Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Water Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Other Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

1299<

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
1041	15	20	20	20
2	20	15	15	20
3	20	15	20	25
4	20	20	20	20
5	20	15	15	15
6	15	15	15	15
7	15	15	5	5
8	5	5	5	10
9	10	10	10	10
10	10	10	10	10
11	10	10	10	10
1203	5	10	10	5
4	5	5	5	5
5	5	5	<5	<5
6	5	5	5	5
7	5	5	5	5
8	5	5	5	5
9	5	5	5	5
10	5	5	5	5
11	5	5	5	<5
12	<5	<5	5	5
13	5	5	5	5
	215	210	205	215

Time	0	1/4	1/2	3/4

Stove Name ______
Date 9/4/81
Clock Times (24 H) ______
Run # 15
Phase # 1
Observer PET
Distance to Source N 50 ft
Direction to Source NW
Wind Direction NW
Wind Velocity 0-1
Cloud Cover 80%
Plume Background roof and trees
Stability ______
Relative Humidity ______
Type Contaminant ______
Color ______

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

____ Units No. ______

Minutes of Observation ______

300< Sorry I didn't get one more set
Ave 4.60

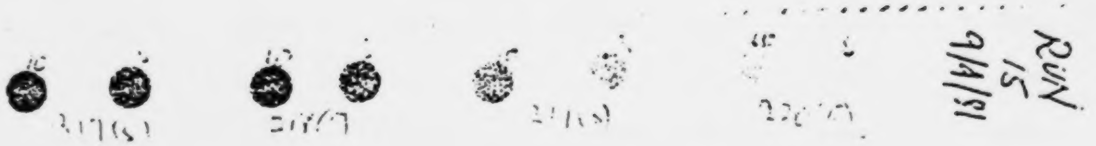
Bacharach Smoke Spot

Run 15 Date 9/4/81 Operator JC

Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value	Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value
217	1152	S	[illegible]	5					
218	1157	D	150						
219	1232	S	305	6					
220	1237	D	140	4					

Comments:

Run 15


Run 15 9/4/91

8 8 6 4

3[illegible]2<

ORSAT DATA

Stove Name

Date [illegible]

Run # 15

Phase # –

Operator [illegible]

Sample Time 1148

Portable Orsat

	CO_2	O_2	CO	N_2
Accumulative	5.4	19.0	190	
Net	5.4	13.6	0	

Sample Time 1219

	CO_2	O_2	CO	N_2
Accumulate	8.2	200	200	
Net	8.2	8		

Sample Time 1303

	CO_2	O_2	CO	N_2
Accumulate	7.0	20.4	20.4	
Net	7.0	13.4	0	

Sample Time

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Sample Time

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Moisture Data

Stove Name ____________

Date 9/2/81

Run # 15

Phase # 7 ———

Operator JC

Time (24 H)	Temperature Wet Bulb	Temperature Dry Bulb	Moisture Percent
1047	150	320	20

Wood Moisture

Date 9 4·81 Test Run # 15

Operator JC

Meter Measurement

FUEL	Logs #	A	B	C	D	E	F	G	H	AVE	
1	117	23	26	26	27	18	21	21	20	22.7	25
2	118	18	22	21	19	23	24	23	27	22.1	24
3	119	20	22	22	23	26	23	20	25	22.6	24
4	120	22	22	22	21	22	24	24	23	25.5	27
5											
6											
7											
8											
9											
10											
11											
12											
Kindling											

Total Mass 14.6 lbs

Percent Moisture 25 %

Total Mass (Dry Basis) 11 lbs

306

p 1 2

Operating Parameters

Run # 16 Date 9/9/81 Clock Time (24 H) 10:15 Operator SEN

Stove Name

Fuel: Initial Charge (lb) Remaining Coal Bed (lb)

Test Charge 1 pieces 15.7 lb; Kindling Several pieces 1.9 lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES O_2						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	~~Opacity~~ Meter	Catalyst ~~Pre~~	Catalyst Post	CO %	CO_2 %	HC ppm		
0	17.6											
5	14.4		740	440	12.5		918	.85	10.0	85	<5	CLOSED to 3/8 open 10:21
12	13.0		658	480	15.0		782	.45	7.0	35	<5	
16	12.3		651	460	15.0		745	.32	5.0	25		
20	11.9		635	450	16.0		715	.26	4.5	25	<5	
25	11.1		630	430	—		697	.28	4.5	35	<5	
30	10.5		604	400	17.0		632	.30	4.0	40	<5	
35	9.9		567	380	17.5		593	.37	3.0	60	<5	
40	9.3		580	350	17.5		554	.37	3.25	65	<5	
45	8.9		560	320	15.5		567	.44	3.0	85	10	
50	8.1		647	320	15.75		697	.27	4.5	45	5	
55	7.2		651	320	—		698	.21	4.5	35	<5	
60	6.7		610	320	17.0		646	.21	3.6	40	<5	

7: [illegible]

Comment Number:

p. 2 2

Operating Parameters

Run # 16 Date 9/9/81 Clock Time (24 H) ______ Operator SM

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			(TRANS.) Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	Opacity Meter	Catalyst Pre	Catalyst Post ①	CO %	CO_2 %	HC ppm		
65	6.1		582	325	17.25		610	.26	3.25	45	<5	
70	5.6		598	330	16.5		630	.23	3.0	50	<5	
75	5.1		588	330	17.0		599	.26	3.25	55	<5	
80	4.7		579	310	17.25		575	.28	3.5	60	<5	
85	4.2		607	300	16.50		604	.24	3.0	35	<5	
90	3.6		640	300	16.75		601	.23	3.5	45	<5	
95	3.4		670	300	16.5		598	.22	3.5	45	<5	
100	2.9		655	310	17.0		566	.23	3.5	45	<5	
105	2.2		669	325	16.5		624	.28	3.25	50	<5	
110	1.9		688	330	16.5		602	.18	3.5	35		
115	1.6		639	340	17.0		578	.17	3.5	30		
119	1.2		697	340	17.5		545	.22	3.5	35		

Comment Number: ~~7580~~ 7512

308
^

page 1 of 2

STOP in lbs.

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ 1.84 Date 9/9/81 Train Operators DCP
Run # 16 Phase # N.A. Clock Time (24 H) 1015 - 1215
Sample Box # Nopp #1 Stack Dimensions 8" ø
Probe Length 6' Barometric Pressure 29.81" Hg
Probe Material Steel Nozzle Diameter 0.502" ø

Cp = 0.803

#7 plenum 3 AIR

medium % III fuel

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			POST CATALYST #4	chamber Comments #8	% in gas
			Calc.	Act.		T in	T out			Imp.	WB	DB			
0	842.832			.15	257	79	78	0	250	364			432	326	est 25
1.5				.20	500					547			1046	730	
3		.012		.20	589	79	79	0	245				1039	884	
4.5		.006		.20	654					911			1121	840	
7		.005	.10	.15	484	79	79	0	221	710			941	740	est 23
10		.004	.10	.15	420	79	79	0	210	644				686	
13	845.37	.004		.15	351			0		601					
16		.004	.12	.13	353	79	79	0	208	586					est 20
20	847.27	.004	.12	.15	359	79	80	0	230	538			726	642	
25	848.28	.003	.09	.13	365	80	82	0	249	547					10
30	849.31	.003	.11	.13	358	81	82		265	522					
35	850.30	.003	.11	.15	334	81	83	0	283	480					
40	851.28	.003	.11	.15	317	81	83		290	447			579	532	
51	853.44	.003	.11	.15	330	82	84	0	304	450					
62	855.49	.003	.12	.15	310	83	85		259	447					5

Page 2 of ___

sup 1,3

inc.

Oregon Method 7 Sampling Data Sheet

Stove Name ___ H@ ___ Date 9/9/81 Train Operators ___
Run # 16 (cont) Phase # NA Clock Time (24 H) ___
Sample Box # ___ Stack Dimensions ___
Probe Length ___ Barometric Pressure ___
Probe Material ___ Nozzle Diameter ___

Elapsed Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures #7			Comments		
			Calc.	Act.		T in	T out			~~Imp.~~	WB	DB	#4	#8	%m
70	857.13	.003	.13	.15	316	83	85	0	271	421			629	599	3
84	859.87	.003	.13	.15	303	84	86	0	298	397					
95	862.41	.003	.13	.15	297	85	86	0	258	665					
107	864.89	.003	.13	.15	299	85	87	0	254	408					
119	867.49	.003	.13	.15	293	84	87	0	260	418			559	611	
120	867.675														

Oregon Method 7 Sample Recovery Data Sheet

Stove Name PS048 Date 9/9/81

Run # 16 Phase # ______ Clock Times (24 H) ______

Box # 1

CONDENSED WATER DETERMINATION

Impinger:	#1	#2	#3	#4	Total Condensate
Final Weight	565.7	541.2	429.9	731.1	
Initial Weight	537.0	539.4	429.6	726.2	
Net Weight	28.7	1.80	0.3	4.9	Total 35.7

$\underbrace{28.7 \quad 1.80 \quad 0.3}_{30.80}$

FILTER IDENTIFICATIONS

Front Filter-First Filter # 082 Back Filter-First Filter # 235

Front Filter-Second Filter # ____ Back Filter-Second Filter # ____

WASH IDENTIFICATION

Probe/Front Filter Wash ______

Impinger Wash ______

Blank ______

CREOSOTE COUPONS

Plate Location TRANS. Plate Location Probe

Plate Identification 19A Plate Identification 19B

	Date	~~Mg~~	Date	~~Mg~~
Tare				
		56.7196		67.0542
Final				
		56.7323		67.06[illegible]
Net		[illegible]		[illegible]
		[illegible] mg		[illegible] mg

#1- 138ml

#2 - 112ml

Laboratory Total Particulate Calculations

Stove Name 45048 Date of Sampling 9/9/81
Run # 16 Phase # ______ Date of Analysis ______
Box # 1?) Analyst ______

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 143 (ml) of Acetone
Final 74.8738 (mg) - Tare 74.8162 (mg) net 57.6 mg
- Blank ((.009 mg/ml)(143 ml) = 1.287 mg) = 56.313 mg

II. Filter catch(es). F#082 B# 235
Front filter Final 0.5133 (mg) - Tare 0.4722 (mg) 0.0411
+ Back-up filter Final 0.2785 (mg) - Tare 0.2075 (mg) = 0.0710 mg
Total 112.1 mg

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2 CL2 85 ml
Final 70.9027 (mg) - Tare 70.8395 (mg) net 63.2 mg
- Blank ((.0025 mg/ml)(85 ml) = .2125 mg) = 63 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.

Final 70.9060 (mg) - Tare 70.8439 (mg) net 62.1 mg
- Blank ((.006 mg/ml)(245 ml total
- 30.8 ml condensed = 214.2 ml) = 1.29 mg) = 60.81 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used ACETONE
Final 72.4885 (mg) - Tare 72.3878 (mg) net 100.5 mg
- Blank ((.009 mg/ml)(250 ml) = 2.25 mg) = 98.45 mg

VI. Other particulate catches. = ______ mg

VII. Total particulate = I+II+III+IV+V+VI = 390.67 mg

Blanks

Acetone Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Methylene chloride Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Water Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Other Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4	Time	0	1/4	1/2	3/4
1019	<5	<5	<5	<5					
20	<5	5	<5	<5					
21	<5	<5	<5	<5					
22	<5	<5	<5	<5					
23	<5	<5	5	<5					
24	5	10	5	5					
25	<5	<5	<5	<5					
26	5	5	<5	<5					
27	5	5	5	5					
28	5	5	5	5					
29	<5	<5	<5	<5					
1200									
1	0	<5	<5	<5					
2	<5	<5	<5	<5					
3	<5	<5	<5	<5					
4	<5	<5	<5	<5					
5	<5	<5	<5	<5					
6	<5	<5	<5	<5					
7	<5	<5	<5	<5					
8	<5	<5	<5	<5					
9	<5	<5	<5	<5					

Stove Name ________

Date 9/9/81

Clock Times (24 H) ________

Run # 16

Phase # 1

Observer PET

Distance to Source ~ 50 ft

Direction to Source N

Wind Direction W

Wind Velocity 0-2

Cloud Cover 100%

Plume Background Trees

Stability ________

Relative Humidity ________

Type Contaminant ________

Color ________

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

____ Units No. ________

Minutes of Observation ________

.312< <5

Bacharach Smoke Spot

Run [illegible] Date 1/7/81 Operator TC

Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value	Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value
221	[illegible]	[illegible]	351	[illegible]					
222	1031	C	255	[illegible]					
223	1104	S	317	5					
224	1113	O	210	5					
225	1210	S	242	[illegible]					
~~226~~	~~1221~~	O							

Comments:

Run 16

5 5 5 5 5

ORSAT DATA

Stove Name ______ Date ______

Run # 10 Phase # – Operator JC

Sample Time 1053

Portable Orsat

	CO_2	O_2	CO	N_2
Accumulative	2.6	19.4	-	
Net	2.6	16.8	-	

Sample Time ______

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Sample Time ______

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Sample Time ______

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Sample Time ______

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Moisture Data

Stove Name ______

Date 9/5/81

Run # 16

Phase # —

Operator JC

Time (24 H)	Temperature		Moisture Percent
	Wet Bulb	Dry Bulb	
1050	130	460	10
1113	125	420	5
1125	120	380	3

Wood Moisture

Date 9/9/81 Test Run # 16
Operator JC

FUEL	Log #	Meter Measurement									
		A	B	C	D	E	F	G	H	AVE	
1	121	23	16	21	23	16	24	23	19	20.6	
2	122	21	23	22	20	27	24	26	25	23.5	
3	123	13	23	23	13	24	27	26	25	21.7	
4	126	21	25	26	22	19	24	23	18	22.2	
5										22	
6											
7											
8											
9											
10											
11											
12											
Kindling											

Total Mass 16.8
Percent Moisture 24 % (corrected, dry basis)
Total Mass (Dry Basis) ______

318<

pa 1 -

Operating Parameters

Run # 17 Date 9-9-81 Clock Time (24 H) 14:16 Operator SEN

Stove Name

Fuel: Initial Charge (lb) Remaining Coal Bed (lb) .5

Test Charge 4 pieces 17.9 lb; Kindling several pieces .8 lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	~~Opacity Meter~~ O2	Catalyst		CO %	CO_2 %	HC ppm		
						Pre	Post ④					
0	18.7											
5	17.0		569	390	16		604	1.6	10	135	5	
10	16.0		581	380	16.5		589	1.1	5.5	120	10	
15	15.2		567	350	16.0		549	.65	5.0	85	10	
20	14.4		556	335	15.5		560	0.52	3.6	75	8	
25	13.6		607	325	16.0		552	0.50	3.6	70	5	
30	12.7		611	310	22.0 ⑧		530	0.50	4.5	65	4	
35	12.2		560	300	16.5		515	.45	4.0	55	5	
40	11.7		550	300	17.0		499	.45	3.5	55	5	
45	11.0		560	280	17.25		490	.45	3.25	60	5	
50	10.5		520	275	17.50		479	.45	3.25	65	5	TO PHASE 2
60	9.3		507	260	17.5		457	.48	3.0	70	10	
65	8.6		624	270	17.5		474	.47	3.0	75	5	

Comment Number: 14.18 DAMPER → 1/4"

⑧ — Sampling Probe removed for WB/OB

page 2 of

Operating Parameters

Run # 17 Date 9/9/81 Clock Time (24 H) ______ Operator SS

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) ______

Test Charge ______ pieces ______ lb; Kindling ______ pieces ______ lb

Elasped Time Minutes	Fuel Weight (lbs)	TEMPERATURES Combustion Air	Combustion Chamber	Stove Surface	~~Opacity~~ O2 Meter	Catalyst Pre	Catalyst Post	NDIR CO %	NDIR CO2 %	NDIR HC ppm	Opacity	Comments (Footnotes)
70	8.1		502	260	17.75		446	.46	3.5	75	8	
75	7.7		464	250	18.0		436	.48	3.0	75	5	
80	7.1		476	240	17.50		458	.39	3.0	65	5	
85	6.7		454	240	17.75		434	.36	3.0	60	5	
90	6.4		416	240	18.0		396	.36	3.0	65	5	
95	6.1		397	230	18.5		389	.37	2.5	60	5	
100	5.9		396	230	18.25		395	.34	2.5	60	5	
105	5.6		395	220	18.25		389	.34	2.5	60	5	
110	5.3		388	210	18.50		373	.34	2.5	60	5	
115	5.0		384	210	18.50		364	.35	2.5	60	5	
120	4.7		375	200	18.75		358	.35	2.25	55	5	open damper @ 14:12
125	4.6		371	200	18.75		360	.33	2.25	50	5	
130	4.3		461	200	15.5		468	.35	2.25	55		
			5479									

Comment Number:

1319<

320<

4b

page 3 of ___

Operating Parameters

Run # 17 Date 9-9-81 Clock Time (24 H) ________ Operator SEA

Stove Name ________

Fuel: Initial Charge (lb) ________ Remaining Coal Bed (lb) ________

Test Charge ________ pieces ________ lb; Kindling ________ pieces ________ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES °C						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	~~Opacity~~ Meter	Catalyst		CO %	CO_2 %	HC ppm		
						Pre	Post					
135	3.6		559	220	16.5		540	.47	4.0	80	5	
140	3.3		556	220	17.0		525	.39	3.5	65	5	
145	2.8		528	230	17.5		511	.32	3.3	50	5	
150	2.4		517	240	18.0		489	.30	3.0	45	5	
151	2.1		472	245	18.5		417	.27	2.5	40	5	
155	1.9		463	250	18.5		411	.35	3.0	20	5	
160	1.8		457	240	18.5		406	.25	2.5	20	5	
165	1.6		428	230	18.5		379	.23	2.5	30	5	
175	1.4		423	220	18.5		370	.34	2.5	45	5	

4903

Comment Number:

pa. 1 ___

em pt #1 ~10lk

Oregon Method 7 Sampling Data Sheet

Stove Name ________ H@ 1.84 Date 9/9/81 Train Operators DCP

Run # 17 Phase # 1 Clock Time (24 H) 1416 - 1508

Sample Box # Napp#2 Stack Dimensions 8"Ø

Probe Length 3' Barometric Pressure 29.84" Hg

Probe Material steel Nozzle Diameter 0.625"Ø

<.02CFM@ 18" vac

leak check:

Cp = 0.824 post CAtAlyst

3' replaced AHC

↓ Chamber

Elapsed Time	Meter Vol	Pitot ΔP	Orifice ΔH Calc.	Orifice ΔH Act.	Stack Ts	Gas Meter T in	Gas Meter T out	Vac.	Box T	Temperatures #4 ~~Imp.~~	WB	DB	3' ↓ #7	Comments #8	%m
0	867.818			.40	353	86	86	2	288	804			470		c-5125
2		.006		.40	365								562		
4.5			.30	.40	273	87	87	2	289				534		
6.5	870.20	.005		.37	239								508		
9		.005	.37	.40	244			2.5					499		ost 20
13	872.48	.005	.43	.45	264	87	86	2.5	292	550			472	583	5
18	874.47	.005	.43	.45	181	87	87	3	269				442		
24	876.53	.005		.45	198	87	87	4.5	250				435		
31	879.21	.006	.62	.45	195	87	87	7.5	257				457		ost i5
40	882.68	.006		.45	173	88	88	10.5	276				414		5
50	888.47	.005		.45	181	88	89	13	283				387		
* 52	887.20														

*

.321<

pa. 1 ___

em' phase #2 at 1.4 115-

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ 1.84 Date 9/9/81 Train Operators DLP
Run # 17 Phase # 2 Clock Time (24 H) 1513 - 1713 @ 15" vac
Sample Box # WGpp# 1 Stack Dimensions 8" Ø <0.02CFM
Probe Length 6' Barometric Pressure 29.84" Hg leak check:
Probe Materials S. Steel Nozzle Diameter 0.502 ~~#0~~ Cp=0.803

POST CATALYST

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			3RD AIR chamber Comments		
			Calc.	Act.		T in	T out			#4 ~~Imp.~~	WB	DB	#7	#8	ℓm
52	887.208	.005	.25	.25	178	86	88	0	207				363	e87	5
67	891.68	.005	.22	.25	254	89	89	0	267				365		
76	894.25	.005	.22	.25	242	89	90	0	293	457			345	480	
85	896.83	.004	.18	.23	241	89	90	0	314				326		3
97	900.28	.004	.18	.23	220	90	91		270				295		
108	903.44	.004	.18	.23	216	89	91	0	371				279	389	
120	906.82	.004	.18	.23	189	90	91	0	317				261		
142	913.07	.003		.20	235	90	91	0	240				358		2
159	917.34	.003		.20	240	89	91		277	410			323	462	
172	920.632														

Oregon Method 7 Sample Recovery Data Sheet

Stove Name ____________ Date 9/9/81
Run # 17 Phase # 1 Clock Times (24 H) ____________
Box # 2

CONDENSED WATER DETERMINATION

Impinger:	#1	#2	#3	#4	Total Condensate
Final Weight	562.6	544.4	428.7	714.2	
Initial Weight	528.1	539.5	428.1	710	
Net Weight	34.5	4.9	0.6	4.2	Total 44.2
		40			

FILTER IDENTIFICATIONS

Front Filter-First Filter # 081 Back Filter-First Filter # 236
Front Filter-Second Filter # ____ Back Filter-Second Filter # ____

WASH IDENTIFICATION

Probe/Front Filter Wash ____________
Impinger Wash ____________
Blank ____________

CREOSOTE COUPONS

Plate Location TRANS. Plate Location Probe
Plate Identification 20A Plate Identification 20B

	Date	Mg	Date	Mg
Tare				
		40.6465		40.3977
Final		40.6840		40.4373
Net		.0375		.0396
		375mg		39.6 mg

#1 - 130 ml
#2 - 108

Oregon Method 7 Sample Recovery Data Sheet

Stove Name ______ Date 9/9/81

Run # 17 Phase # 2 Clock Times (24 H) ______

Box # 1

CONDENSED WATER DETERMINATION

Impinger:	#1	#2	#3	#4	Total Condensate
Final Weight	549.7	533.9	430.2	737.4	
Initial Weight	526.2	530.7	430.0	731.0	
Net Weight	23.5	3.2	0.2	6.4	Total
		26.90			33.30

FILTER IDENTIFICATIONS

Front Filter-First Filter # 080 Back Filter-First Filter # 237

Front Filter-Second Filter # ______ Back Filter-Second Filter # ______

WASH IDENTIFICATION

Probe/Front Filter Wash ______

Impinger Wash ______

Blank ______

CREOSOTE COUPONS

Plate Location ______ Plate Location ______

Plate Identification ______ Plate Identification ______

Tape

Date	Mg	Date	Mg

Final

	Date	Mg	Date	Mg
Net				

#1- 120ml
#2- 104ml

Laboratory Total Particulate Calculations

Stove Name PSI48
Run # 17 Phase # 1
Box # 2

Date of Sampling 9/9/81
Date of Analysis ____
Analyst ____

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 166 (ml) of Acetone
Final 74.2210 (mg) - Tare 74.1232 (mg) net 97.8 mg
- Blank ((.009 mg/ml)(166 ml) = 1.49 mg) = 96.31 mg

II. Filter catch(es). F# 281 B# 236
Front filter Final 0.5378 (mg) - Tare 0.4744 (mg) 0.0634
+ Back-up filter Final 0.4340 (mg) - Tare 0.2097 (mg) = 0.2243 mg
Total 2877 mg

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2CL2 85 ml
Final 72.4206 (mg) - Tare 72.2781 (mg) net 142.5 mg
- Blank((.0025 mg/ml)(85 ml) = 0.21 mg) = 142.29 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.

Final 69.8958 (mg) - Tare 69.7790 (mg) net 116.8 mg
- Blank ((.006 mg/ml)(231 ml total
- 40 ml condensed = 191 ml) = 1.15 mg) = 115.65 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Acetone
Final 69.9150 (mg) - Tare 69.7885 (mg) net 126.5 mg
- Blank ((0.009 mg/ml)(232 ml) = 2.09 mg) = 124.41 mg

73.7302 - 73.6548
VI. Other particulate catches. net 75.4 mg = 75.4 mg

Total 201.9 mg
VII. Total particulate = I+II+III+IV+V+VI = ____ mg

Blanks

Acetone Final ____ (mg) - Tare ____ (mg)
= ____ mg/ ____ ml = ____ mg/ml

Methylene chloride Final ____ (mg) - Tare ____ (mg)
= ____ mg/ ____ ml = ____ mg/ml

Water Final ____ (mg) - Tare ____ (mg)
= ____ mg/ ____ ml = ____ mg/ml

Other Final ____ (mg) - Tare ____ (mg)
= ____ mg/ ____ ml = ____ mg/ml

Laboratory Total Particulate Calculations

Stove Name BS048 Date of Sampling 9/9/81
Run # 17 Phase # 2 Date of Analysis ______
Box # 1 Analyst ______

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 138 (ml) of Acetone
Final 73.9846 (mg) - Tare 73.8810 (mg) net 103.6 mg
- Blank ((.009 mg/ml)(138 ml) = 1.24 mg) = 102.36 mg

II. Filter catch(es). F# 08D B# 237
Front filter Final 0.5329 (mg) - Tare 0.4765 (mg) 0.0564
+ Back-up filter Final 0.4320 (mg) - Tare 0.2144 (mg) = 0.2176 mg
Total 274.0 mg

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2 CL2 85 ml
Final 70.5004 (mg) - Tare 70.3373 (mg) net 163.1 mg
- Blank((.0025 mg/ml)(85 ml) = .2125 mg) = 162.89 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.

Final 72.5488 (mg) - Tare 72.4517 (mg) net 97.1 mg
- Blank ((.006 mg/ml)(217 ml total
- 26.90 ml condensed = 190.10 ml) = 1.14 mg) = 95.96 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Acetone
Final 72.7745 (mg) - Tare 72.5866 (mg) net 187.9 mg
- Blank ((.009 mg/ml)(211 ml) = 1.90 mg) = 186.0 mg

VI. Other particulate catches. = ______ mg

VII. Total particulate = I+II+III+IV+V+VI = 821.21 mg

Blanks

Acetone Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Methylene chloride Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Water Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Other Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

FLUE GAS EXHAUST PLUME EVALUATION FORM

Phase I ↓

Time	0	1/4	1/2	3/4
1418	15	15	20	15
19	15	15	15	15
20	15	20	15	20
21	20	20	25	20
22	20	20	20	20
23	20	20	20	20
24	25	20	20	20
25	15	20	20	25
26	25	20	20	25
27	15	15	15	20
→ Phase II				
1540	10	10	10	10
41	10	10	15	10
42	10	10	10	10
43	10	10	10	15
44	10	10	10	10
45	10	15	10	10
46	10	15	10	10
47	10	10	10	10
48	15	10	10	15
49	10	10	10	10

185 185 190 200

AVE 19.00

105 110 105 [illegible]

Time	0	1/4	1/2	3/4
- Phase II ↓				
1659	10	10	10	15
1700	10	10	10	10
1	10	10	10	10
2	10	10	10	10
3	10	10	10	10
4	10	10	10	10
5	10	10	10	10
6	10	10	10	10
7	10	10	10	10
8	10	10	10	10

100 100 100 105

Ave 10.13

Total phase 2 10.44

Stove Name ____________

Date 9/9/81

Clock Times (24 H) ____________

Run # 17

Phase # 1&2

Observer PET

Distance to Source ~50ft

Direction to Source N

Wind Direction 2-3 mph WNW

Wind Velocity ____________

Cloud Cover 100%

Plume Background Trees

Stability ____________

Relative Humidity ____________

Type Contaminant ____________

Color ____________

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

____ Units No. ____________

Minutes of Observation ____________

1327

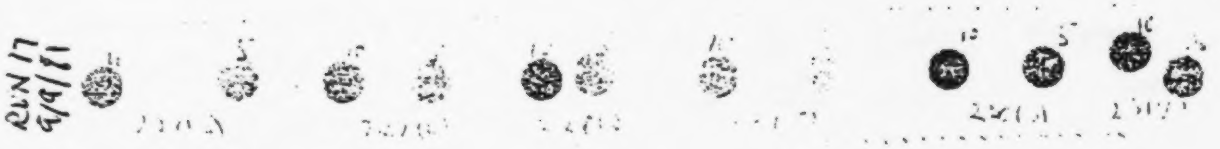
Bacharach Smoke Spot

Run 17   Date 9-4-81   Operator JC

Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value	Test Number	Time (24 H Elap)	Sample Location	Temp.	Spot Value
[illegible]	1445	S	257	6					
227	1448	0	165	6					
228	1540	S	253	6					
229	1544	0	150	5					
230	1634	S	243	6					
231	1637	0	155	6					

Comments:

Run 17



4 6 6 5 6 6

ORSAT DATA

Stove Name ____________ Date [illegible]

Run # 11 Phase # I Operator JC

Sample Time 1455

Portable Orsat

	CO_2	O_2	CO	N_2
Accumulative	2.6	19.2	19.2	___
Net	2.6	16.6	–	___

Leak test
1503 Burette reads 18.0
1508 reads 17.6

Phase II Sample Time 1610

	CO_2	O_2	CO	N_2
Accumulate	2.0	20.2	20.4	___
Net	2.0	17.8	0.2	___

Switched to Bench orsat

Sample Time 1704

	CO_2	O_2	CO	N_2
Accumulate	2.0	20.0	20.3	___
Net	2.0	18.0	0.3	___

Sample Time ____________

	CO_2	O_2	CO	N_2
Accumulate	___	___	___	___
Net	___	___	___	___

Sample Time ____________

	CO_2	O_2	CO	N_2
Accumulate	___	___	___	___
Net	___	___	___	___

Moisture Data

Stove Name ____________________ Date 7/9/81

Run # 17 Phase # ____________ Operator JC.

Time (24 H)	Temperature Wet Bulb	 Dry Bulb	Moisture Percent
1430	125	490	2%
1452	120	370	3%
1550	110	280	3%
1645	110	330	2%

Wood Moisture

Date 17 [illegible] Test Run # 17

Operator TC

Meter Measurement

FUEL	[illegible]	A	B	C	D	E	F	G	H	AVE	
1	125	17	25	24	21	15	22	22	15	20.1	
2	127	13	20	21	13	12	20	22	12	16.6	
3	~~127~~	13	21	20	12	13	19	22	12	16.5	
4	129	28	27	27	29	16	24	23	22	24.5	
5	124									24	
6	130									24	
7										23	
8											
9											
10											
11											
12											
Kindling											

Total Mass ______

Percent Moisture 25

Total Mass (Dry Basis) ______

page 1 of 1

Operating Parameters

Run # 18 Date 9/15/81 Clock Time (24 H) ______ Operator SEN

Stove Name ______

Fuel: Initial Charge (lb) ______ Remaining Coal Bed (lb) .2

Test Charge 4 pieces 18.1 lb; Kindling ______ pieces 1.0 lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES						NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	O_2 ~~Opacity~~ Meter	Catalyst		CO %	CO_2 %	HC ppm		
						Pre	Post					
0	19.1											
5	17.0		1575		—			.65	13	105	0	
10	15.6		1581		8.5			.50	14	60	5	
15	13.9		1668		8.5			.30	14	15	10	
20	12.0		1778		3.5			.27	14	0	8	
25	10.2		1746		5.5			.31	13	0	5	
30	8.2		1660		6.5			.13	14	0	8	
35	6.3		1525		6.5			.05	14	0	8	
40	4.7		1453		7.5			.04	14	0	8	
45	3.4		1368		10.0			.05	13	0	8	
50	2.6		1292		11.0			.07	9.0	0	8	
55	2.0		1281		11.5			.11	10.0	0	8	
60	1.3		1297		11.0			.08	9.0	0	8	

Comment Number:

.334

pag. 1 .. ___

end l.: 165.

Oregon Method 7 Sampling Data Sheet

Stove Name ___ H@ 1.84 Date 9-15-81 Train Operators DLP

Run # 18 Phase # NA Clock Time (24 H) 1044-1145

Sample Box # Nepp# Stack Dimensions 8"ø

Probe Length 3' Barometric Pressure 29.72"Hg

Probe Material steel Nozzle Diameter 0.502"ø

leak check ⇒ <.02cfm at 16"Hg vac

Cp = 0.824

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments	
			Calc.	Act.		T in	T out			Imp.	WB	DB	~~#8~~	%m
0	920.785	.010		.25	543	75	74	.5	298	70			1515	sr 25
1.5		.008			925								1576	
2				.25	976			1					1644	
3.5		.004		.25	927	76	75	1	283	73			1490	
6	922.52	.004		.25	725									es? 20
11.5		.005	.09	.15	751	78	77		265	72			1627	
18	924.	.006	.10	.10	764	80	81		289	71				
23	926.440	.006		.10	943	82	82		288	68			1798	
30	927.63	.005	.11	.13	890	84	84	1	291	72			1687	es? 15
36	928.87	.005	.11	.15	650	86	87	1	293	73			1536	
~~59.7~~ ~~46~~				~~.15~~	~~54~~	~~90~~	~~90~~		~~252~~	~~77~~			~~1334~~	
59	934.32	.004		.13	488								1301	
61	934.708													

Oregon Method 7 Sample Recovery Data Sheet

Stove Name ______ Date 9/15/81
Run # 18 Phase # ______ Clock Times (24 H) ______
Box # 2

CONDENSED WATER DETERMINATION

Impinger:	#1	#2	#3	#4	Total Condensate
Final Weight	572.9	532.4	429.9	740.3	
Initial Weight	527.6	529.9	429.5	737.4	
Net Weight	45.30	2.50	0.4	2.9	Total 51.10
		48.20			

FILTER IDENTIFICATIONS

Front Filter-First Filter # 085 Back Filter-First Filter # 346
Front Filter-Second Filter # ____ Back Filter-Second Filter # ____

WASH IDENTIFICATION

Probe/Front Filter Wash ______
Impinger Wash ______
Blank ______

CREOSOTE COUPONS

Plate Location TRANS Plate Location Probe
Plate Identification 21A Plate Identification 21B

Tare

	Date	~~M~~g	Date	~~M~~g
		40.6618		40.5094
Final				
		40.6620		40.5220
Net		.0002		.0121
		0.2mg		12.1mg

#1-142ml
#2-104ml

Environmental Services
1380 NW Lancashire Ct
Beaverton, OR 97006
(503) 645-9685

OMNI

LABORATORY TOTAL PARTICULATE CALCULATIONS

Client PS048 Source Description
Plant Date(s) Analysis
Sampling Date(s) 9/15/81 Run # 18 Project # PS048

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 155 (ml) of ACETONE
Final 70.8541 (mg) - Tare 70.8395 (mg) net 14.6 mg
- Blank ((.009 mg/ml)(155 ml) = 1.345 mg) = 13.205 mg

II. Filter catch(es). F# 085 B# 346
Front filter Final 0.5008 (mg) - Tare 0.4741 (mg) 0.0267
+ Back-up filter Final 0.2193 (mg) - Tare 0.2179 (mg) = 0.0014 mg
total 28.1 mg

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2CL2 75 ml
Final 74.1262 (mg) - Tare 74.1236 (mg) net 2.6 mg
- Blank((.0025 mg/ml)(75 ml) = .1875 mg) = 2.4125 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.

Final 70.8445 (mg) - Tare 70.8297 (mg) net 14.8 mg
- Blank ((.006 mg/ml)(235 ml total
- 48.2 ml condensed = 186.8 ml) = 1.1208 mg) = 13.679 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Acetone
Final 72.6675 (mg) - Tare 72.6601 (mg) net 7.4 mg
- Blank ((.009 mg/ml)(171 ml) = 1.539 mg) = 5.861 mg

VI. Other particulate catches. = mg

VII. Total particulate = I+II+III+IV+V+VI = 63.26 mg

Blanks

Acetone Final (mg) - Tare (mg)
= mg/ ml = mg/ml

Methylene chloride Final (mg) - Tare (mg)
= mg/ ml = mg/ml

Water Final (mg) - Tare (mg)
= mg/ ml = mg/ml

Other Final (mg) - Tare (mg)
= mg/ ml = mg/ml

FLUE GAS EXHAUST PLUME EVALUATION FORM

Time	0	1/4	1/2	3/4
1032	75	75	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
36	0	0	0	0
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0
41	0	0	0	0
11:33				
1142 →				

all 0%

Time	0	1/4	1/2	3/4

stack @ 350°

Stove Name
Date 9/15
Clock Times (24 H) 1032
Run # 18
Phase #
Observer PET
Distance to Source N50ft
Direction to Source NW
Wind Direction NNW
Wind Velocity 0-1
Cloud Cover 0
Plume Background trees
Stability
Relative Humidity
Type Contaminant
Color

No. of Readings	% Opacity
	0
	10
	20
	30
	40
	50
	60
	60+

Units No.

Minutes of Observation

AVE 0

.337<

ORSAT DATA

Stove Name __________ Date 7-15-81

Run # 17 Phase # 2 AA Operator JC

Sample Time 1107

	CO_2	O_2	CO	N_2
Accumulative	19	20	20.0	
Net	19	1		

Sample Time 1138

	CO_2	O_2	CO	N_2
Accumulate	9.0	19.6	20.0	
Net	9.0	~~17.6~~ 10.6	0.4	

Sample Time __________

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Sample Time __________

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Sample Time __________

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Moisture Data

Stove Name

Date 9-15-81

Run # 17

Phase # 12A

Operator JC

Time (24 H)	Temperature Wet Bulb	 Dry Bulb	Moisture Percent
1052	170	730	~25
1134	170	496	

Note: Temperatures are too high for valid readings.

Wood Moisture

Date 9/15/81 Test Run # 18

Operator JC

Meter Measurement

FUEL	Log #	A	B	C	D	E	F	G	H	AVE	
1	130	16	23	24	17	18	23	25	23	21.1	
2	131	19	22	23	23	23	24	26	19	22.4	
3	132	15	22	23	18	16	20	21	14	18.6	
4	133	21	24	25	23	22	23	23	23	23.0	
5											
6											
7											
8											
9											
10											
11											
12											
Kindling											

Total Mass 18.1

Percent Moisture 21 % (Corrected, dry basis)

Total Mass (Dry Basis) ______

13 – MR 2
1.5 – CIVR

pa… 1 of ___

Operating Parameters

Run # 19 Date 9-15-81 Clock Time (24 H) 1405 Operator ~~9/15/81~~

Stove Name ___

Fuel: Initial Charge (lb) ___ Remaining Coal Bed (lb) .20 (TARED)

Test Charge 4 pieces 18.1 lb; Kindling ___ pieces 1.4 lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES			O_2			NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	~~Opacity~~ Meter	Catalyst Pre	Catalyst Post	CO %	CO_2 %	HC ppm		
0	19.5											
5	17.2		1520	200	2.0			2.2	15	130	<5	
10	14.7		1364	200	9.5			.15	14	0	0	
15	13.3		1264	201	12.5			.19	10	0	0	
20	12.2		1167	201	13.5			.26	7.5	0	0	
25	11.2		1010	201	15.0			.36	5.5	0	0	
30	10.5		860	202	15.0			.45	5.0	10	0	
35	9.9		764	202	16.0			.70	3.6	50	5	
40	9.2		1307	202	7.0			.70	2.5	75	5	
45	8.3		1393	203	5.0			.55	12	25	<5	
50	7.0		1396	205	8.0			.40	12	10	<5	
55	6.0		1230	207	9.5			.24	12.0	0	0	
60	5.3		1204	206	10.0			.17	8.0	0	<5	

Comment Number:

page 2 of ___

Operating Parameters

Run # 19 Date 9-15-81 Clock Time (24 H) ________ Operator ________

Stove Name ________

Fuel: Initial Charge (lb) ________ Remaining Coal Bed (lb) ________

Test Charge ________ pieces ________ lb; Kindling ________ pieces ________ lb

Elasped Time Minutes	Fuel Weight lbs	TEMPERATURES			O_2			NDIR			Opacity	Comments (Footnotes)
		Combustion Air	Combustion Chamber	Stove Surface	~~Opacity~~ Meter	Catalyst Pre	Catalyst Post	CO %	CO_2 %	HC ppm		
65	4.6		1173	209	11.5			.13	7.5	0	0	
70	4.1		1149	212	12.0			.13	7.0	0	0	
75	3.5		1182	—	11.0			.13	6.0	0	0	
80	3.0		1183	210	11.0			.12	5.5	0	0	
85	2.4		1175	215	11.5			.15	7.0	0	0	
90	2.1		1207	217	11.5			.11	7.0	0	0	
95	1.7		1172	221	11.0			.10	7.0	0	0	
99	1.5		1170	220	11.5			.10	7.0	0	0	

Comment Number:

1342<

page 1 of 1

stuff #: 11.5 lbs

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ 1.84 Date 9-15-81 Train Operators DCP
Run # 19 Phase # #1 Clock Time (24 H) 1405-1430
Sample Box # ~~NP~~#1 Stack Dimensions 8" ø
Probe Length 6' Barometric Pressure 29.68" Hg
Probe Material Steel Nozzle Diameter 0.625" ø

leak ck ⇒ <.02 cfm @ 13" Hg

$C_p = 0.803$

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments	
			Calc.	Act.		T in	T out			Imp.	WB	DB	48	CO M
0	934.818	.006		.30	294	93	93	1	230	80			837	03.25
1.5				.30	625								1327	
2.5		.004		.30	696								1398	
5		.005	.21	.30	958	94	94		240	78			1541	08.20
10	937.96	.005		.30	831	95	94	2	240	78			1399	
15	939.62	.004		.28	673				237	77			1267	
20	941.04	.004		.25	554	97	97	1	240	77			1212	
25	942.489			.23	444								1036	

pag. 1 .. ___

and at 1.5/65

Oregon Method 7 Sampling Data Sheet

Stove Name ______ H@ 1.84 Date 9-15-81 Train Operators DCP
Run # 19 (cm7) Phase # 2 Clock Time (24 H) 1436-1545
Sample Box # Nagg #2 Stack Dimensions 8" ø
Probe Length 3' Barometric Pressure 29.68" Hg
Probe Material Steel Nozzle Diameter 0.502" ø Cp = 0.824

leak ck < .00 CFM at

Elasped Time	Meter Vol	Pitot ΔP	Orifice ΔH		Stack Ts	Gas Meter		Vac.	Box T	Temperatures			Comments
			Calc.	Act.		T in	T out			Imp.	WB	DB	#8 % O2
25	942.49	.005	.23	.25	142	100	98	0	289	80			826 est 15
30	943.93	.005		.25	159	101	107	1	287	79			763
43	947.83	.006		.25	253					77			1413
52	950.42	.006		.25	230	104	105		282	76			1236
59	952.48	.004		.23	203*	104	106		281	77			1187
76	957.45	.006	.19	.25	529	106	107		288	69			1107 est 10
84	959.84	.006		.25	442	106	108	1	279	69			1196
93	962.470												

NOT USED ~ calculation? RN

* SC observed low T's

Oregon Method 7 Sample Recovery Data Sheet

Stove Name ______ Date 9/15/81

Run # 19 Phase # 1 Clock Times (24 H) ______

Box # 1

CONDENSED WATER DETERMINATION

Impinger:	#1	#2	#3	#4	Total Condensate
Final Weight	557.2	537.9	428.1	716.6	
Initial Weight	530.3	535.5	427.9	714.5	
Net Weight	26.90	2.40	0.2	2.10	Total 31.60

$\underbrace{26.90 \quad 2.40 \quad 0.2}_{29.5}$

FILTER IDENTIFICATIONS

Front Filter-First Filter # 086 Back Filter-First Filter # 238

Front Filter-Second Filter # ______ Back Filter-Second Filter # ______

WASH IDENTIFICATION

Probe/Front Filter Wash ______

Impinger Wash ______

Blank ______

CREOSOTE COUPONS

Plate Location ______ Plate Location ______

Plate Identification ______ Plate Identification ______

Tare

	Date	Mg	ZZA	Date	Mg	ZZB
		40.4457			40.6342	
Final						
		40.4457			40.6410	
Net		,0006			.0068	
		0.6mg			6.8mg	

#1-120
#2-102

Oregon Method 7 Sample Recovery Data Sheet

Stove Name ______ Date 9/15/81

Run # 19 Phase # 2 Clock Times (24 H) ______

Box # 2

CONDENSED WATER DETERMINATION

Impinger:	#1	#2	#3	#4	Total Condensate
Final Weight	555.6	527.6	429.9	743.3	
Initial Weight	530.3	525.3	429.2	740.0	
Net Weight	25.3	2.3	0.7	3.3	total 31.6
		28.3			

FILTER IDENTIFICATIONS

Front Filter-First Filter # 087 Back Filter-First Filter # 347

Front Filter-Second Filter # ______ Back Filter-Second Filter # ______

WASH IDENTIFICATION

Probe/Front Filter Wash ______

Impinger Wash ______

Blank ______

CREOSOTE COUPONS

Plate Location ______ Plate Location ______

Plate Identification ______ Plate Identification ______

Tape

	Date	~~M~~g 23A	Date	~~M~~g 23B
		40.4578		40.6562
Final				
		40.4587		40.6566
Net		,0004		.0004
		0.9 mg		0.4 mg

#1 - 130 ml
#2 - 99 ml

Laboratory Total Particulate Calculations

Stove Name ____________ Date of Sampling 9/15/81

Run # 19 Phase # 1 Date of Analysis ____________

Box # 1 Analyst ____________

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 145 (ml) of Acetone
Final 70.3591 (mg) - Tare 70.3372 (mg) net 21.9 mg
- Blank ((.009 mg/ml)(145 ml) = 1.305 mg) = 20.595 mg

II. Filter catch(es). F# ~~238~~ 086 B# 238
Front filter Final 0.4896 (mg) - Tare 0.4701 (mg) 0.0195
+ Back-up filter Final 0.2075 (mg) - Tare 0.2063 (mg) = 0.0012 mg
20.7 mg

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2CL2 85 ml
Final 70.8927 (mg) - Tare 70.8841 (mg) net 8.6 mg
- Blank((.0025 mg/ml)(85 ml) = .2125 mg) = 8.3875 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.

Final 72.9912 (mg) - Tare 72.9778 (mg) net 13.4 mg
- Blank ((.006 mg/ml)(216 ml total
- 29.5 ml condensed = 186.5 ml) = 1.12 mg) = 12.28 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Acetone
Final 72.6243 (mg) - Tare 72.6098 (mg) net 14.5 mg
- Blank ((.009 mg/ml)(185 ml) = 1.665 mg) = 12.835 mg

VI. Other particulate catches. = ______ mg

VII. Total particulate = I+II+III+IV+V+VI = 74.80 mg

Blanks

Acetone Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Methylene chloride Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Water Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Other Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

ORSAT DATA

Stove Name ______ Date 9-15-81

Run # 17 Phase # II Operator JC

Sample Time ~~[illegible]~~ 1456

Bench Orsat

	CO_2	O_2	CO	N_2
Accumulative	13.0	20.2	20.2	
Net	13.0	7.2	0	

Sample Time 1525

	CO_2	O_2	CO	N_2
Accumulate	9.2	19.8	19.8	
Net	9.2	10.6	0	

Sample Time ______

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Sample Time ______

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Sample Time ______

	CO_2	O_2	CO	N_2
Accumulate				
Net				

Laboratory Total Particulate Calculations

Stove Name ______ Date of Sampling 9-15-81
Run # 19 Phase # 2 Date of Analysis ______
Box # 2 Analyst ______

I. Rinse & brushings of nozzle, probe, and pre-filter glassware.
Evaporation of 115 (ml) of Acetone
Final 73.6478 (mg) - Tare 73.6316 (mg) net 16.2 mg
- Blank ((.009 mg/ml)(115 ml) = 1.035 mg) = 15.165 mg

II. Filter catch(es). F#087 B#347
Front filter Final 0.4805 (mg) - Tare 0.4676 (mg) 0.0129
+ Back-up filter Final 0.2268 (mg) - Tare 0.2187 (mg) = 0.0081 mg
Total 21.0 mg

III. Hydrocarbon obtained by solvent extraction of water in in impingers and bubblers.
Solvent used CH2CL2 75 ml
Final 69.1366 (mg) - Tare 69.1284 (mg) net 8.2 mg
- Blank((.0025 mg/ml)(75 ml) = .1875 mg) = 8.0125 mg

IV. Particulate from evaporation of water in impinger and bubblers following extraction.

Final 71.3424 (mg) - Tare 71.3297 (mg) net 12.7 mg
- Blank ((.006 mg/ml)(218 ml total
- 28.3 ml condensed = 189.7 ml) = 1.1382 mg) = 11.562 mg

V. Particulate from solvent rinse of impinger, bubblers, and post-filter glassware.
Solvent used Acetone
Final 73.7748 (mg) - Tare 73.7636 (mg) net 11.2 mg
- Blank ((.009 mg/ml)(168 ml) = 1.51 mg) = 9.64 mg

VI. Other particulate catches. = ______ mg

VII. Total particulate = I+II+III+IV+V+VI = 65.43 mg

Blanks

Acetone Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Methylene chloride Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Water Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Other Final ______ (mg) - Tare ______ (mg)
= ______ mg/ ______ ml = ______ mg/ml

Wood Moisture

Date 9-15-81 Test Run # 19

Operator JC.

Meter Measurement

FUEL		A	B	C	D	E	F	G	H	AVE	
1	135	25	27	27	26	26	26	28	27	26.5	
2	136	20	20	23	23	23	23	23	24	22.4	
3	137	14	22	23	15	18	24	24	19	19.9	
4	138	16	24	23	19	21	26	26	23	22.3	
5									Ave =	23	
6											
7											
8											
9											
10											
11											
12											
Kindling											

Total Mass 18.1

Percent Moisture 25 ~~23%~~ (corrected, dry basis)

Total Mass (Dry Basis) ______